Victorian
Competition & Efficiency
Commission

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15 February 2010

Mr Andrew Padanyi
Energy Safe Victoria
PO Box 262 Collins Street West
VIC 8007

Dear Mr Padanyi

ASSESSMENT OF REGULATORY IMPACT STATEMENT

Thank you for seeking an assessment of the Regulatory Impact Statement (RIS) on the proposed Electricity Safety (Electric Line Clearance) Regulations 2010. The Victorian Competition and Efficiency Commission (VCEC) received the final version of the above RIS and draft regulations on 15 February 2010.

The VCEC assesses the adequacy of the RIS prior to the public consultation process as required under section 11 of the *Subordinate Legislation Act 1994*.

I advise that the RIS meets the requirements of section 10(3) of the *Subordinate Legislation Act 1994*.

The VCEC's assessment is based on the adequacy of the evidence presented in the RIS and is focused on the quality of the analysis rather than the merits of the proposal itself. Feedback from affected parties during public consultation may provide further information on the nature and size of the costs and benefits. This must be taken into account when making the final decision as to whether or not to proceed with the proposal.

In the interests of transparency, most departments and agencies publish this assessment letter alongside the RIS when it is released for consultation. The VCEC recommends that you do the same.

The VCEC is building a database of Victorian Government RISs and statements of reasons for change, and will be putting your material on our website when it is released. Please inform us when you have placed this RIS on your website. Please also provide us with an electronic copy of your statement of reasons for changes to the final regulations when they are provided to the Scrutiny of Acts and Regulations Committee (refer 5.53 Subordinate Legislation Act 1994 Guidelines, 17 January 2005).

If you have any questions, please contact RegulationReview@vcec.vic.gov.au.

Yours sincerely

Sam Abusah
Assistant Director
Victorian Competition and Efficiency Commission

PROPOSED ELECTRICITY SAFETY (ELECTRIC LINE CLEARANCE) REGULATIONS 2010

Regulatory Impact Statement

(FINAL 15/02/10)

This Regulatory Impact Statement (RIS) has been prepared in accordance with the **Subordinate Legislation Act 1994** to facilitate public consultation on the proposed *Electricity Safety (Electric Line Clearance) Regulations 2010.* A copy of the proposed regulations is provided as an attachment to this RIS.

Public comments and submissions are invited on the proposed regulations. All submissions will be treated as public documents. Written comments and submissions should be forwarded to:

Mr Andrew Padanyi
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and must be received no later than 5pm on Tuesday 25 May 2010.

Frontispiece

This regulatory impact statement was prepared for Energy Safe Victoria by Tim Harding & Associates in association with Rivers Economic Consulting.

Summary

Introduction

In Victoria, contact between overhead electric lines and trees can have dire consequences, including bushfires, electrocutions and power loss. Such events can result in deaths, injuries and economic loss. The risks of such events can be reduced to as low as reasonably practicable by maintaining appropriate clearance spaces between overhead electric lines and trees.

Part 8 of the **Electricity Safety Act 1998** specifically requires responsible persons to keep the whole or any part of a tree clear of an electric line. 'Responsible persons' include electricity distribution companies; occupiers of land, public land managers and VicRoads where there are electric lines; and owners or operators of electric lines. A breakup of the category and number of responsible persons is illustrated in Table 1 below:

Table 1: Category and number of responsible persons in 2009/10

Category of responsible person	Number of Responsible persons
Transmission Businesses	**2**
SP Powernet Pty Ltd Basslink	
Distribution Businesses	**6**
Jemena NE SPI Electricity Pty Ltd Citipower Powercor + Powercor (Docklands) United Energy Distribution (UED) Country Energy	
Other responsible persons under Sec.84 of the Act	**104**
70 councils Melbourne Water Vic Roads Yarra Trams MainCo Parks Victoria Melbourne airport Bendigo Trams Tramway Museum Society of Victoria Ballarat tramway Museum Falls Creek Alpine Resort Management Board Mt Buller Mt Stirling Alpine Resort Management Board Perseverance Corporation Limited 22 Wind farms	
Total	***112***

To achieve this, section 89 of the Act requires that there shall at all times be regulations in place prescribing a code of practice for electric line clearance. That is to say, there cannot be a situation where regulations cannot exist. The Act also specifies that such regulations have a life of not more than five years. The existing *Electricity Safety (Electric Line Clearance) Regulations 2005* ('the existing regulations') will therefore automatically expire on 30 June 2010. The proposed regulations are required to be open

for public comment for a period of ninety days in accordance with section 89 of the **Electricity Safety Act 1998**.

This Regulatory Impact Statement (RIS) assesses the proposed Electricity Safety (Electric Line Clearance) Regulations 2010 ('the proposed regulations'), which are intended to replace the existing regulations on or before their expiry date, with some modifications. A summary of the differences between the proposed regulations and the existing regulations is given in Part 5.2 and Appendix 1 to this RIS.

The modifications to the existing regulations contain improvements recommended by the regulator established by the Act, Energy Safe Victoria (ESV) in consultation with the Electric Line Clearance Consultative Committee (ELCCC) established by section 87 of the Act and other key stakeholders. These improvements draw on the operational experience of the existing regulations since 2005. The main changes are in the following six areas:

1. Under the proposed regulations, only major electric companies would need to submit their management plans to ESV for approval; whereas under the existing regulations, all responsible persons (except for land occupiers) need to submit their management plans to ESV for approval.
2. The definition of environmentally or culturally significant trees is more specific under the proposed regulations, and the new clause 2(3) of the Code restricts the cutting of these trees to the minimum extent necessary. Greater protection is to be given to:
   - areas of native trees, trees of ecological, historical or aesthetic significance or trees of cultural or environmental significance;
   - vulnerable, endangered or critically endangered faunal species under the **Flora and Fauna Guarantee Act 1988**.

   As a result of these changes, the advice of a qualified arborist or horticulturalist will no longer be required before cutting or removal of these trees under the proposed regulations.
3. Responsible persons would need to notify and consult occupiers or owners of private land or affected persons (as the case requires) before pruning or clearing vegetation under the proposed regulations. The existing regulations require firms to either obtain permission or to give at least 14 days written notice to occupiers or owners of private land or affected persons before cutting or removal of vegetation. As part of the permission seeking process, it is assumed that there are, at times, some negotiations between responsible persons and occupiers/owners of private land/affected persons about a variety of issues (including: the nature of the cutting or removal; when it will occur; special trees; access to property etc). Negotiation is, of course, a natural consequence of many situations where permission is required by one party from another. ESV has no empirical data in relation to the number, duration or frequency of these negotiations. It is possible that negotiations occur each year with some land owners or occupiers. An example of a need for negotiation might be that a landowner does not want to allow access to their property; however, the responsible person can comply with

the regulations only by accessing the land to allow physical access to the trees and to do so in a safe manner. These negotiations can be an important aspect of obtaining permission as land owners of even small parcels of land can hold up major works or cause re-visits. This is particularly the case where the land is in remote areas or fire prone areas. Finally notification and consultation under the proposed regulations can be by written notice or newspaper advertisement; whereas under the existing regulations, consultation by newspaper advertisement is permitted only after taking reasonable steps and being unable to give *written* notice.

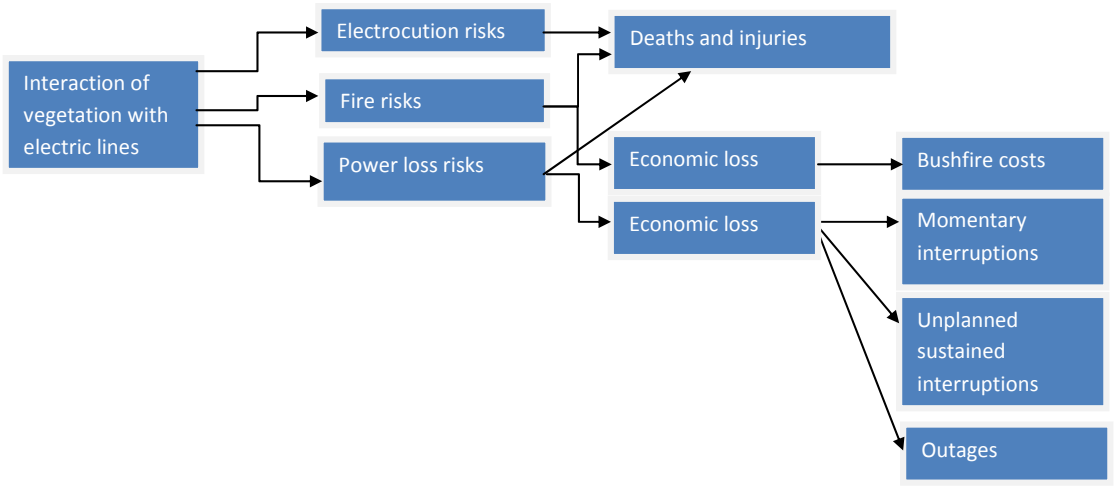
4. Under the proposed regulations, minimum clearance spaces surrounding aerial bundled cable or insulated cable would also apply to small tree branches; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.
5. Under the proposed regulations, minimum clearance spaces surrounding powerlines in hazardous bushfire risk areas would apply to tree branches above a powerline of 22,000 volts; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.
6. The penalty for a breach of proposed subregulation 9(4) is also increased under the proposed regulations from 10 penalty units (i.e $1,168.20 in 2009/10) to 20 penalty units (i.e. $2,336.40 in 2009/10), bringing it into line with other penalties imposed by the proposed regulations. This subregulation relates to the requirement on major electric companies to ensure that a management plan is prepared and submitted to ESV by the specified time, which is now 31 March in each year. Under section 157(3) of the Act, 20 penalty units is the maximum penalty that can be imposed for a breach of the regulations. Management plan requirements help to safeguard public safety and the reliability of power supplies, and it is appropriate that the penalties reflect their importance to the greatest available extent. The other offence provisions ensure that all duties set out in the proposed regulations are enforceable, which is not the case with some duties in the existing regulations.

The problems

The problems underlying this regulatory proposal are discussed in some detail in the body of the RIS, but generally arise in relation to the following specific sources of risk arising from contact between electric lines and trees or other vegetation:

1. Extreme risks to public safety and property from bushfires;
2. Severe risks of loss of power supplies;
3. Safety risks to individuals from electrocution;
4. Environmental risks from overcutting or excessive removal of vegetation; and
5. Risks of inadequate notification and consultation.

Each of the first three risks can result in deaths and injuries, if not adequately managed. Fire risks and power loss can also result in economic loss. The relationships between these risks and resulting consequences can be illustrated by the following flow chart.



The extreme nature these risks is also illustrated by the fact that contact between only one tree and one electric line could start a major bushfire, with devasting consequences to lives and property.

On the basis of estimates given in Part 2.1 of the RIS, the cost of Victorian bushfires caused by interactions between vegetation and electric lines has been reduced by at least 95% since the introduction of tree clearance legislation and the code of practice in 1984. Successive versions of the regulations and the Code have therefore shown to be highly successful in reducing the incidence of bushfires due to contact or close proximity between vegetation and electric lines.

There are also severe risks associated with the loss of power supplies, whether caused by fire or by trees falling on to electric lines, thus causing power losses with or without fire. Possible consequences of power loss include loss of production, communications, closure of workplaces and schools, loss of air-conditioning in high temperatures etc. The main aspects of economic loss considered in this RIS due to risks from power loss include momentary interruptions (loss of power less than 1 minute); unplanned sustained interruptions and outages in relation to electricity transmission.

The main driving issue behind the cost/benefit analysis of the RIS relates to the idea that the major incremental benefits of the proposed regulations over the base case stem from the economic activity benefits attained by reducing the probability of interruptions from distribution companies due to the interaction of vegetation with electric lines. [See sub heading 'Benefits (cost savings) to economic activity' in Part 4.3.4 in the RIS and Part 2.1 of Appendix 2 for a more detailed discussion]. The cost of interruptions or outages to electricity supply is commonly discussed using the term *Value of Unserved Energy* (VUE). The measure of VUE can be broken down into two components:

- the *Value of Consumer Reliability* (VCR). VCR (a term used interchangeably with the the term Value of Lost Load (VoLL)), is defined as the weighted average measure of the economic cost to consumers of being without an electricity supply. A wide range of customers is considered in the VCR measure, including residential, agricultural, commercial and industrial, as well as a wide range of interruption durations (up to 24hrs); and

- the Value of Social Disruption (VSD). VSD is defined as the economic cost to social services across the state of Victoria in the event of outages. These services include those outside individual households and businesses and including: community services such as emergency services (e.g. fire, police and ambulance services); health care services; transport (air/public/roads); communication; water and sewerage; and waste disposal.

The formula for interruption costs to electricity supply is given by:

$$VUE = VCR + VSD$$

Using a mean value of unserved energy (VUE) of $52.24/kWh (see Part 2.1 of Appendix 2), a total of 793,309hrs of interruptions (see Part 2.2.1 of Appendix 2) and an average weighted demand of 13.54kW per hour (see Part 2.1.2 of Appendix 2) – the total value of for momentary and unplanned sustained interruptions due to vegetation in an unregulated environment is estimated in this RIS to be ***$561.17 million*** per annum. The value of unserved energy (VUE) for transmission outages in an unregulated environment is estimated to be approximately ***$212.68 million*** per annum.

Apart from the abovementioned risks to Victorian communities, there are risks to individuals of electrocution as a result of vegetation contact with electric lines. There are also risks to native flora and fauna from possible overcutting or excessive removal of vegetation, when maintaining clearance spaces from electric lines.

Penalties

The opportunity has also been taken to correct one of the penalties under the proposed regulations. The problems described above obviously lie at the more severe end of the scale of problems commonly addressed by regulatory proposals. For this reason, it is appropriate that the regulations prescribe penalties that are commensurate with the gravity of the offences and their potential consequences.

For example, under the existing regulations, the penalty prescribed for failure to prepare a management plan is significantly lower than the penalty prescribed for failure to comply with the management plan. This difference is inconsistent with the view that not having a management plan at all is likely to have worse consequences than the failure to comply with a part of a management plan. Management plan requirements help to safeguard public safety and the reliability of power supplies, and it is appropriate that the penalties reflect their importance to the greatest available extent.

Given the lack of proportionality between the offence and penalty the penalty has been doubled from 10 penalty units (i.e $1,168.20 in 2009/10) to 20 penalty units (i.e. $2,336.40 in 2009/10) which is the maximum under the Act.

The policy objective

Having regard to purposes of the Act and the identified problems, the following overarching policy objective is therefore proposed for the purposes of this RIS:

To reduce to as low as reasonably practicable the risks of:

- *fire, electrocution and power loss; and*
- *consequential deaths, injuries and economic loss;*

as a result of vegetation coming into contact with electric lines.

The words 'as low as reasonably practicable' are interpreted to include within reasonable costs together with adequate and reasonable conservation of native flora and fauna (refer to Part 2.1 of this RIS). The main test for assessing the proposed regulations against the practicable alternatives is their relative net benefit in achieving this policy objective.

Market failure – the need for intervention

The need for intervention or relevant sources of market failure addressed by the proposed regulations are those associated with **public goods** and **externalities**.

Public safety, a functioning economy (including community services) and conservation of native and significant flora and fauna are prime examples of **public goods.** Consumption of the benefits of such public goods by one individual does not reduce the amount of benefits available for consumption by others. A market solution will fail to provide or provide sufficient levels of the public good because of free riding. That is to say, there would be no way for the provider to keep those who do not pay for the public good from enjoying the benefits of that good. In this case, public safety and environment protection would be provided by markets to some extent because it is in the interests of owners and/or operators of electric lines to protect capital assets from damage. Electric companies and land occupiers would have an incentive to ensure their business operations are not interrupted due to problems arising from inadequate clearance between trees and electric lines. However, these incentives are unlikely to be sufficient to protect public safety and environment as the damage to the public and environment as a result of major incident can often be far more than the damage to the electric line itself and potential loss of business revenue (refer to Part 2.1 of this RIS).

Moreover, it could be argued that persons (including corporate persons) are subject to a duty of care under common law. In the absence of the proposed regulations, it may be suggested that the duty discussed above would provide an incentive to the owners and/or operators of electric lines to take positive steps to prevent the interaction of lines with vegetation. In addition to wanting to avoid potential litigation, electricity companies and other responsible persons would have an incentive to ensure their operations are not interrupted due to power loss or other consequences of inadequate tree clearance.

However, the factors referred to above would fail to adequately address the problems that the proposed regulations seek to address. Firstly the ability to totally safeguard against the risks of vegetation interacting with electric lines – undergrounding the assets – was disallowed by the Essential Services Commission in the 2006-10 price review for electricity distribution. This was due to concerns for consumer access to energy and

prices. The market is therefore restricted in its ability to total safeguard against such risks in this manner. Secondly, in an environment where *overhead electric lines* continue to exist, voluntary risk management would not be adequate in providing sufficient public safety, economic activity, and conservation. The proposed regulations, would be needed to ensure 100% compliance and a 'reasonably practicable' minimisation of risks.

Externalities arise where private decision makers do not incur all the costs or receive all the benefits of their decisions. Negative production externalities, arising from the cutting and removal of vegetation, may result in the over destruction of native trees and flora of ecological, historical, cultural or environmental significance. Removal or cutting of a habitat tree may also cause breeding problems to fauna which is endangered or critically endangered. This would lead to 'social costs' which are greater than the private costs of cutting and removal activity. Such activity would have negative consequences for the state of Victoria with too few resources being allocated to conservation as discussed earlier under 'public goods'.

Corporate owners of electric lines are obliged under corporations law to act in the interests of the company's shareholders. It is acknowledged that shareholder interests have changed over time placing greater emphasis on corporate and social responsibility in order to meet more sophisticated consumer preferences including environmental demands. However such an emphasis remains voluntary and would not be expected to internalise all third party social costs.

The viable options

The viable options assessed in terms of costs and benefits in this RIS are:

- *Option A*: confine regulations to prescribing the code only; and would not prescribe penalties, management plans, or ESV power to grant exemptions (the minimum regulation option);

- *Option B*: remake the existing regulations and existing code. (The differences between the existing and proposed regulations are summarised in this summary).

- *Option C:* the proposed regulations with the existing code. (The differences between the existing and proposed code are summarised below in this summary).

- *Option D:* the proposed regulations with the proposed new code;

- *Option E*: the proposed regulations with the proposed new code, excluding clause 5 relating to notification and consultation of land occupiers and owners prior to cutting or removal of trees; and

- *Option F*: a variation of the proposed regulations and code incorporating a different approach used in another jurisdiction, namely the buffer zones used in South Australia, as discussed in Part 3.0 of this RIS.

The cost/benefit assessment

The broad categories in the evaluation of the various options are:

- Benefits to public safety;
- Benefits of economic activity;
- Benefits to conservation of native and significant flora and fauna; and
- Costs of compliance/adherence and administration.

For sunsetting regulations, the 'base case' is normally defined as having no replacement regulations. According to the *Victorian Guide to Regulation*, the reason for undertaking cost-benefit analysis against an unregulated situation is 'to ensure that the policy development process considers the full impact on society, in terms of costs and benefits, of the regulatory proposal and other viable options'. However, because of s.89(2) of the Act, there must always be regulations in place prescribing the Code of Practice ('the Code'). Therefore, the 'normal' base case as recommended by the *Victorian Guide to Regulation* is not lawfully feasible for this particular RIS.

On the other hand, it would be conceivably possible to make regulations that comply with the Act, but which impose no costs and confer no benefits. For the purpose of cost/benefit assessment in this RIS, these 'base case' regulations would be simply those which prescribe clearance spaces under the Code, consistent with the requirements of the Act. For these reasons, the base case for this RIS is assumed to be regulations that impose no costs and confer no benefits beyond those which are already provided by the Act (i.e the costs of clearance and the benefits associated with having to keep minimum clearance spaces).

In quantifying the costs and benefits of the proposed regulations, the principal difficulty has been in obtaining appropriate quantitative data on which to base the cost and benefit calculations. In many cases this data simply does not exist. In other cases, where there are available data sets, these have been compiled by various authors over time for widely differing purposes. The data sets are consequently not directly comparable with each other in either the time span over which they are collected or in definition of parameters collected. For example, 'fire' could range from a small, contained asset fire like a pole top fire, to a 'fire start', to a 'ground fire', to a 'vegetation fire' all the way to a 'bushfire'. In this RIS therefore, where specific data has been absent, expert judgement by ESV has had to be exercised in the selection of available information to act as a 'proxy' data to enable the analysis to proceed.

Table 28 provides a summary of incremental costs and benefits for each of the Options as compared to the base case, according to the broad categories. The incremental benefits in terms of public safety and economic activity (i.e. cost savings) have been estimated by taking the costs under the base case and deducting the costs occurring in the relevant Option. For example, as shown in Table A2.6 the cost of interruptions under Options B and C in terms of VUE is dedcuted from the cost of interruptions under the 'base case'.

The incremental benefits contained within this RIS are illustrative only. They are based on assumptions developed by ESV and illustrate that a small percentage reduction in the incidence of unplanned interruptions to power supply would generate significant cost savings (benefits).

Table A2.6 Annual VUE of interruptions avoided (distribution) under Options B and C as compared to the base case – 2010/11 to 2014/15

Momentary hrs of interruption/annum under the base case	**4,492**
Unplanned sustained hrs of interruption/annum under the base case	788,817
Total hrs of interruption/annum under the base case	793,309
VUE Base Case (total hrs of interruption/annum(793,309 hrs)*$52.24/kWh*13.54kW demand/hr	$561,171,863.54
VUE Options B and C (total hrs of interruption/annum (726,217hrs)*$52.24/kWh*13.54kW demand/hr	$513,712,570.07
Total incremental VUE saved under Options B and C	**$47,459,293.47**

In terms of conservation benefits, incremental benefits are calculated not as cost savings but more directly and are taken to be the difference between the conservation benefit provided under the 'base case' and the relevant Option, as shown in the example below in Table A2.35.

Table A2.35: Estimated annual incremental conservation benefits provided under Options B and C

Value of conservation provided under the base case = 5% less than $15,480,660	**$14,743,485**
Value of conservation provided under Options B and C = 1.93% of the total annual value of conservation value of $800,852,982)	$15,480,660
Total annual value of incremental conservation benefits under Options B and C	**$737,174**

Table 28: Summary of incremental 5 year costs and benefits (2009 dollars) – Options A, B, C, D, E and F – as compared to the 'base case'

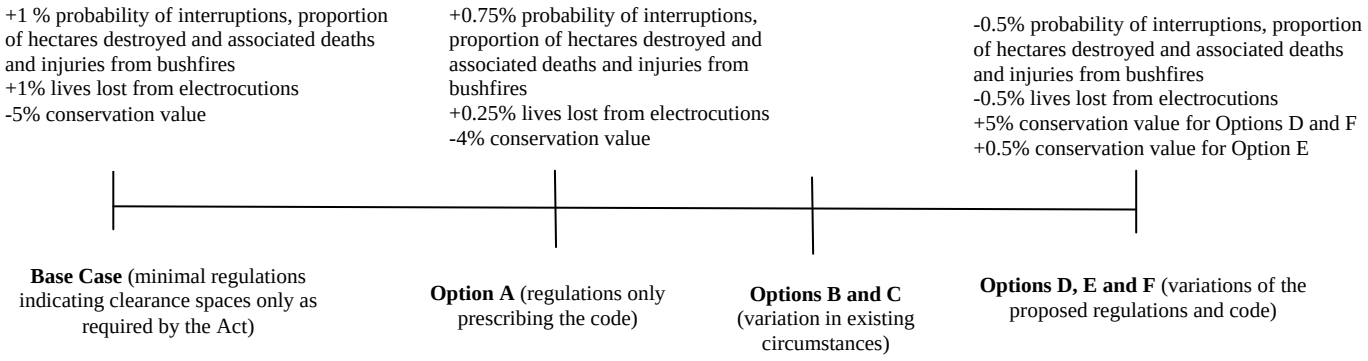
Option	Public safety benefit	Economic activity benefit	Conservation benefit	Total incremental benefit	Total incremental Compliance/ adherence and admin cost	Net incremental benefit
Option A	$354,902	$191,065,293	$553,663	$191,973,858	$40,727,494	$151,246,364
Option B	$1,702,659	$857,478,733	$3,328,380	$862,509,772	$36,060,401	$826,449,370
Option C	$1,702,659	$857,478,733	$3,328,380	$862,509,772	$35,936,585	$826,573,186

Option	Public safety benefit	Economic activity benefit	Conservation benefit	Total incremental benefit	Total incremental Compliance/ adherence and admin cost	Net incremental benefit
Option D	**$2,553,988**	**$966,127,021**	**$6,823,180**	**$975,504,189**	**$58,309,774**	***$917,194,415***
Option E	$2,553,988	$966,127,021	$3,677,860	$972,358,869	$56,771,858	*$915,587,011*
Option F	$2,553,988	$966,127,021	$6,823,180	$975,504,189	$73,069,486	*$902,434,702*

Determinants of main economic activity benefits

Options B and C provide $108.65 million less incremental economic activity benefits than Options D, E and F as compared to the 'base case'. This difference is mainly attributable to the lower level of interruptions avoided under Options D, E and F as compared to Options B and C. The main driver in difference between the incremental benefits under Options B and D relates to assuming a lower probability of an interuption occuring under option D due to vegetation relative to option B. As shown in Line Chart 1, Option D assumes a 0.5% reduction in the probability of vegetation causing interruptions as compared to Option B. That is to say, there would be a 1.5% reduction in the probability in interruptions due to vegetation under Option D – as compared to the 'base case', whereas there would be a 1% reduction in the probability of interruptions under Option B – as compared to the 'base case'.

Line Chart 1: Relative treatement of benefit factors (excluding outages) under Options A, D, E and F in relation to Options B and C for assessment against the 'base case'



The assumption of an hourly sector weighted demand for power 13.54kW (see Part 2.1.2 of Appendix 2) is the main determinant of the level of *overall size of benefits* under each of the Options. In this RIS the loss of power is taken to be 1kW per hour for residential customers and 20kW per hour for non-residential customers. Given sector weightings for Value of Consumer Reliability (VCR) (see definition under the problem section) measures for residential, and non-residential sectors of 34% and 66%, respectively – a weighted kW per hour of 13.54 is assumed:

$$1kW \times 34\%(residential) + 20kW \times 66\% \ (commercial) = 13.54kW$$

The value of unserved energy (VUE) avoided due to interruptions under each of the Options including the 'base case' is summarised in Table I below:

Table I: Incremental VUE avoided in relation to interruptions: economic activity benefit (i.e. cost savings)

Option	VUE avoided in relation to interruptions (economic activity benefit)
A	$46,338,309
B and C	$214,281,196
D, E and F	$321,421,794

An assumption of only 1kW lost amongst both residential and non-residential sectors would yield smaller incremental benefits for all Options and the difference in incremental benefits between Options D, E and F as compared to Options B and C would be smaller. However this would be an inappropriate assumption which would fail to capture the real electric power needs of the commercial sector – (i.e. in order to capture the segmentation in the market obviously the commercial sector has a greater demand for power than a residential property). For example, small shops and factories will have a peak load of about 24 kW per hour with bakeries going up to 72 kW per hour. Apart from the issue of appropriately segmenting the market, it must be emphasised that 1kW would not be sufficient to power even 1 toaster when talking about the residential sector. For a domestic premises the demand for power ranges from 14 kW (older houses) up to 24 kW total peak load. Appliances range from 0.2 kW for a TV, 2.4 kW for a toaster, and up to 3 to 6 kW for air conditioners.

For the purposes of estimation of economic benefits in terms of outages avoided and due to data limitations, a third order proxy of 0.5% representing the share of the percentage of bushfires ignited by electricity networks between 1976/77 and 1995/96, is used to determine the proportion of outage events instigated by vegetation coming into contact with transmission lines. Whilst this is a main determinant of the level of incremental benefits it has no effect on the choice of the preferred Option as the proportion of outage events taken is identical to all Options B, C, D, E and F.

Determinants of conservation benefits

A major driver of incremental conservation benefits of elecric lines in terms of the corridors they provide, is the proportion of area in which thay take up as a percentage of the total area of the State of Victoria. This is estimated to be *1.93%* (see Part 2.6 of the RIS for a detailed discussion). The second important variation in conservation benefits between Option B and C and Option D and F, for example is the assumption regarding the level of additional conservation of the latter over the former (see Line chart 1). It is assumed that Options D and F provide 5% more conservation benefits than B and C. This assumption of 5% more conservation benefits is due in particular to the introduction of *clause.2.3* under the *proposed Code* which recommends minimum possible cutting or removal of native or significant vegetation would provide additional benefit in relation to the conservation. This clause is more targeted to vegetation requiring protection and

would help to prevent excessive cutting or removal. For these reasons as well as 100% compliance, Option D would provide greater conservation benefits than Options A, B or C (see Table 28).

Determinants of public safety benefits (deaths and injuries from bushfires)

The number of lives lost and injuries sustained in bushfires is correlated to the proportion of hectares burnt as a proxy (i.e. the geater the area burnt the increased likelyhood of deaths and injuries) This need for a proxy is due to data limitations in regards to the number of lives lost and injuries sustained as a result of the interaction of vegetation with electric lines. The value of incremental benefits in terms of lives saved and injuries sustained are attributable to this assumption which is a main driver in the difference of benefits between Options B and C as opposed to D, E and F (see Table 28)

Line Chart 1 above illustrates the *relative* treatement of benefit factors (not including outages) under Options A, D, E and F in relation to Options B and C (variations in *existing* circumstances), for the purpose of assessment against the 'base case': For example in Option D relative to Option B there is a reduced probability of -0.5% of an interruption, hectares destroyed and associated deaths and injuries as a result of bushfires – which means that relative to the base case there is a reduced probability of 1.5%. In the case of Option D relative to Option B there is a reduced precentage of lives lost from electrocutions by 0.5%, which entails a 1.5% reduction in lives lost from electrocutions under Option D as compared to the 'base case'. In relation to conservation value for Options D and F relative to Option B, there is a 0.5% increase in conservation value – which entails a 10% increase in conservation value under Option D as compared to the 'base case'.

With respect to outages, Line Chart 2 compares the probability of outages arising from the interaction of vegetation with transmission lines under Options A, B, C, D, E and F versus the 'base case' – for the purpose of cost/benefit assessment. As shown in Line Chart 2, the treatement of probability for all the Options is identical (except for Option A) Therefore, this benefit factor (outages avoided) does not have an impact on the choice of Option in the case of variations on the exisiting and proposed regulations and Code. However, the probability of outages under Option A is increased from 0.5% to 1.25% in order to reflect the increased risk of Option A as compared to all the other Options. This is done to reflect the lack of approval process and audits of managment plans – which is seen to be one of the *most important* aspects of risk management and, therefore, benefits (i.e. cost savings) accuring.

Line Chart 2: Comparison of treatement of probability of outages under Options A, B, C, D, E and F and the 'base case'

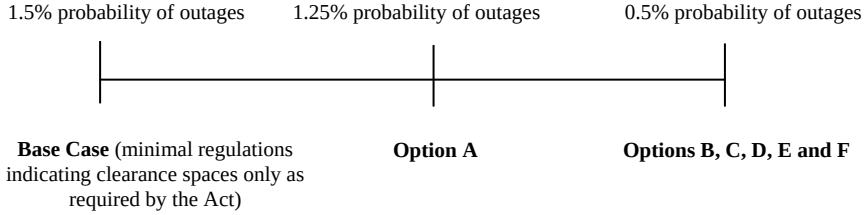


Table 29, provides a summary of cost-benefit ratios over 5 years for Options A, B, C, D, E and F. The cost - benefit ratio establishes the level of costs incurred by the particular Option for every $1 of benefit (including cost savings) obtained. For example, Option D would impose $0.0598 cost for every $1 of benefit obtained.

Table 29: Summary of 5-year cost-benefit ratios – Options A, B, C, D, E and F

Option	5-year cost-benefit ratio
Option A	0.2122
Option B	0.0418
Option C	0.0417
Option D	**0.0598**
Option E	0.0584
Option F	0.0749

Determination of preferred option

Both net benefit and cost-benefit ratios are considered in the determination of the preferred option.

In summary, *Option A* (prescribed Code only) would entail minimum adherence costs but also minimum benefits, which would not adequately achieve the identified policy objective.

Options B (existing regulations with existing code) and C (proposed regulations with existing code) would entail similar costs and benefits which would be greater than Option A, except that the quantifiable costs of Option C would be slightly less than Option B. Options B and C would adequately achieve the identified policy objective.

Option D (the proposed regulations with proposed code) would entail higher benefits than Options B, C, and E, and at a lower cost (except for Option E).

Option E (the proposed regulations with proposed code excluding clause 5) would entail higher benefits than Options B and C, but less benefits than Options D and F; together with lower costs than Options B and C.

Option F (the proposed regulations and proposed Code with a buffer zone requirement) would entail similar benefits to Option D and higher benefits than Option E, but at a higher cost than those Options.

Options B and C provide the lowest cost-benefit ratio of 0.0418 and 0.0417, respectively, followed by Option E with a ratio of 0.0584 (see Table 29). Option D (the proposed option) has a slightly higher cost-benefit ratio of 0.0598 than Option E. However, the reason behind the ranking of these ratios is that the incremental benefit under Option D over and above Options B, C and E makes up a smaller proportion of total benefits, whereas, the incremental cost of Option D over and above Options B, C and E, makes up a higher proportion of total costs. For example, as shown in Table 28 the percentage change in the increase in incremental benefit going from $862.51m (Option B) to $975.5m (Option D) is only 13.1%. However the percentage change in the increase in

incremental cost going from $36.06m (Option B) to $58.31m (Option D) is much bigger and is given as 61.7%. This has the effect of increasing the cost/benefit ratio of Option D as compared to Option B.

Importantly, however, Option D provides the largest net benefit and over 5 years, the incremental net benefit provided by Option D (the proposed regulations and Code) is equal to ***$917.19 million*** in 2009 dollars as compared to the 'base case'. This is ***$90.75m*** more incremental net benefit (as compared to the 'base case'), for example, than the 5-year incremental net benefit of ***$826.45 million*** provided by Option B (the existing regulations and Code). The proposed regulations and the proposed code are therefore the preferred option.

In addition to the preferred option having the largest incremental benefits and large incremental costs – the incremental benefits obtained from the additional elements proposed in option D are larger than the costs by a magnitude of 16.7 times. If Option D was not chosen then this would reduce incremental costs as compared to the base case by $58.31m – however $975.5m of incremental benefit would be *foregone*. It should also be acknowledged that the regulations have a life-span of only 5 years and that stakeholders are in favour of the additional elements of option D (over the Options that have smaller cost/benefit ratios) as indicated by the lengthy process of consultation and agreement by the ELCCC committee.

In summary, the proposed regulations and code (**Option D**) would have the optimum combination of costs and benefits for achieving the policy objective; and the benefits of the proposed regulations (namely public safety, improved economic activity, and conservation) outweigh the costs.

Consultation

The proposed regulations and Code have been developed in consultation with the ELCCC as required under the Act. Part of the role of the ELCCC is to advise the ESV with regard to the preparation and maintenance of the Code. The ELCCC has been closely involved in the preparation of the proposed regulations and Code. Other key stakeholders were also consulted during the development of the proposed regulations as discussed in Part 1.3 of this RIS; and several of these provided valuable cost data for the cost/benefit assessment.

During consultation, some electricity distribution businesses expressed the view that the requirements in the existing regulations for consultation, seeking consent and subsequent notification in the event of failing to obtain consent, were cumbersome and caused significant delays to cutting works. However, these delay costs were assessed by ESV not to be costs of the existing Code but rather costs associated with the electricity distribution businesses'own internal processes. Nevertheless, notification costs were estimated for both the existing and proposed Code for the purposes of the cost/benefit assessment as these are required as per the regulations.

Data regarding notification costs in relation to the proposed Code (clause.5) was given as $5.5m and $0.55m by Powercor and CitiPower, respectively. However, clause 5 of the proposed Code allows responsible persons to notify affected persons via a newspaper

advertisment and not as a last resort as in the existing Code. This will provide a much more cost effective alternative for electricity distribution businesses. The RIS estimates that the cost of placing around 18 notices a year for Powercor to be $9,328 and the cost of placing around 8 notices a year for CitiPower to be $4,146. The newspaper advertisment cost assumed a 1/8 page display advertisment in a local newspaper at an average cost of $518.20.

In relation to exisiting Codes 9.2.1 and 9.2.2, electricity distribution businesses also raised the inappropriateness of allowing contact between vegetation and aerial bundled cables (ABC) or other insulated lines on the basis that abrasion or impact and damage from contact with vegetation can be the source of water ingress and failures at a later date.

Furthermore, SP Ausnet provided data regarding additional clearance costs for 81,200 services in light of the omission of clauses 9.2.1 and 9.2.2 in the proposed Code which related to exemptions with respect to small branches less than 10mm and small vegetation (leaves), respectively. The data which they provided included not only the intial cost of re-establishing clearance spaces of $0.6m per annum in light of the omissions, but also the cost of annual trimming including re-visits of $6.2m per annum. This RIS has not factored in the cost of annual trimming because the omission of the aforementioned clauses in the proposed code does not affect the cutting cycle of distribution companies and only results in a one-off re-establishment cost. Powercor provided data regarding ‘no breach of clearance distances’ and ‘no light touching’ as $6m per annum and $0.6m per annum for Powercor and CitiPower, respectively. However, additional data later supplied by Powercore and CitPower revealed 68,000 and 43,750 clearance services requiring re-establishment at a per service cost of $83.46 (figure supplied by SP AusNet). Therefore, the annualised one-off cost of omission of clauses 9.2.1 and 9.2.2 was estimated to be $1.07m for Powercor and $0.69m for CitiPower.

There was also significant ELCCC discussion on whether there should be any allowance at all for vegetation to overhang bare wires in high bushfire risk areas. In light of this consultation and discussion, existing *Clause 11.2* is omitted from the *proposed code* meaning that vegetation would no longer be allowed to overhang bare overhead power lines in hazardous bushfire risk areas (HBRAs) under certain conditions. The removal of vegetation directly above the clearance space was not seen as feasible according to SP AusNet ‘due to the health and safety risk to personnel attempting to undertake this work…[and]… adverse public reaction’.

According to SP AusNet, in order to meet the requirments of the proposed Code they would have to either ‘re-construct the lines with insulated cables, or place them underground or a combination of both’. The one-off capital costs of investment to do this was suggested by SP AusNet to be $17,500 per span.

However, ESV noted that it is no longer necessary in all cases to send a ‘man-up the tree’ to remove branches in difficult terrain as there is now available helicopter vegetation management technology that can work is such inaccessable terrrain. Secondly, post Black Saturday, ‘adverse public reaction’ is likely to be significantly different from previously. Therefore it is feasible that a significant proportion of this one off investment could be managed under the proposed Code by a cheaper alternative. SP AusNet

provided a figure of $17,500, however given the expert opinion of ESV that it is cheaper than $17,500 an average of 50% of $17,500 per span is taken to be more representative of the costs imposed by the regulation. The figure supplied by SP AusNet was $30-$40m for the one of capital investment in their network. However, data provided by SP AusNet regarding the number of spans affected (i.e. 2000) and the average one-off cost of investment per span of $8,750 (i.e. 50% of $17,500 noted by SP AusNet) revealed an annualised cost of $3.5m and a 5-year cost of $15.8m. Powercor provided a one-off cost estimate of $0.22m per annum regarding this matter however considering that there are only 20 spans affected the annualised cost is calculated in this RIS to be $35,000 or $0.16m over 5 years.

Nature and likely effects of the proposed regulations

The proposed regulations cover the following matters:

- objectives, definitions and other preliminary matters;
- prescribing the Code of Practice for the purposes of the Act;
- identifying the prescribed penalty provisions for the purposes of section 90 of the Act;
- setting out a range of requirements in relation to management plans, including that specified responsible persons must prepare a management plan, the content of management plans; and in the case of major electric company, the management plan must be submitted to ESV for approval.

Under section 84 of the Act, 'responsible person' means the relevant distribution company; occupier of land, public land manager or VicRoads where there are electric lines; or the owner or operator of an electric line (as the case requires).

A summary comparison of the substantive differences (other than wording and changes of penalty) between the existing regulations and the proposed new regulations is given in Appendix 1 to this RIS. The main changes are in six areas:

1. Under the proposed regulations, only major electric companies will need to submit their management plans to ESV for approval; whereas under the existing regulations, all responsible persons (except land occupiers) need to submit their management plans to ESV for approval.
2. The definition of environmentally or culturally significant trees is more specific under the proposed regulations, consistent with other relevant legislation.
3. Responsible persons must notify by newspaper and consult rather than seek permission or notify *in writing* occupiers/owners of private land/affected persons before cutting or removing trees.
4. Under the proposed regulations, minimum clearance spaces surrounding aerial bundled cable or insulated cable will also apply to small tree branches; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.
5. Under the proposed regulations, minimum clearance spaces surrounding powerlines in hazardous bushfire risk areas will also apply to tree branches above

a powerline of 22,000 volts; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.

6. The penalty for a breach of proposed subregulation 9(4) is also increased under the proposed regulations from 10 penalty units (i.e $1,168.20 in 2009/10) to 20 penalty units (i.e. $2,336.40 in 2009/10), bringing it into line with other penalties imposed by the proposed regulations.

Summary of 5-year comparsion of incremental benefits for the existing and proposed regulations and Code

As estimated in Part 4.3 of this RIS, the difference in 5-year incremental benefits between the exisiting and proposed regulations are set out in Table 31. The proposed regulations would provide a 5-year total incremental benefit of ***$112.99 million*** more than the existing regulations.

Table 31: Comparison of 5-year incremental benefits of existing regulations and Code (Option B) and proposed regulations and Code (Option D) – as compared to the base case

Benefit category	Option B (existing regulations) 5-year benefit (2009 dollars)	Option D(proposed regulations) 5-year benefit (2009 dollars)
PUBLIC SAFETY BENEFITS		
Reduction in bushfire related death	$1,481,389	$2,222,083
Reduction in electrocution related death	$168,863	$253,294
Reduction in bushfire related injuries	$52,407	$78,610
Total public safety benefits	**$1,702,659**	**$2,553,988**
ECONOMIC ACTIVITY BENEFITS		
Reduced general economic loss including loss of community services due to reduced loss of power from *distribution lines*	$214,281,196	$321,421,794
Reduced general economic loss including loss of community services due to reduced loss of power from *transmission lines*	$640,182,157	$640,182,157
Reduced paid insurance claims/fire suppression & recovery costs/commercial costs	$3,015,380	$4,523,071
Total economic activity benefit	**$857,478,733**	**$966,127,021**
CONSERVATION BENEFITS		
Total conservation benefit	**$3,328,380**	**$6,823,180**
Total 5-year incremental benefit	***$862,509,772***	***$975,504,189***

Summary of 5-year comparsion of incremental costs for the existing and proposed regulations and Code

As estimated in Part 4.3 of this RIS, the difference in 5-year incremental costs between the existing and proposed regulations is set out in Table 32. The proposed regulations

and code would provide ***$22.25m*** more incremental cost than the existing regulations and code.

Table 32: Comparison of incremental 5-year costs of existing regulations and Code (Option B) and proposed regulations and Code (Option D)

Compliance and administrative cost	Option B 5-year cost (2009 dollars)	Option D 5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$97,759	$88,872
Updating management plans by transmission businesses	$198,662	$180,602
Updating management plans by distribution businesses	$327,793	$297,993
Updating management plans by other responsible persons under sec.84 of the Act	$737,760	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$291,515	$21,057
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$28,928,285	$205,894
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*)	$4,484,261	$1,342,344
New development of dispute resolution procedures (*proposed clause 9*)	$10,732	$10,732
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$0	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$0	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitiydistribution businesses	$0	$19,911,381
Auditing costs for ESV	$798,000	$798,000
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$447	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$106,937	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$78,249	$78,249
Total 5-year incremental cost	***$36,060,401***	***$58,309,774***

Finally, as shown by Table 28 in this RIS, Option D would provide approximately ***$90.75m*** of additional *net benefit* as compared to Option B.

The largest cost differences between the proposed regulations and the existing regulations relate to the omission of clauses 9.2.1, 9.2.2 and 11.1 of the Code (exceptions for certain small tree branches and overhanging branches). However, as an outcome of the stakeholder consultation process, ESV reached the following conclusions in framing the draft regulations:

- for fire and electrical safety reasons, the allowance for contact between vegetation and ABC/insulated lines should be discontinued;
- 'covered conductors' should be subject to the same requirements as bare wires;
- for fire and electrical safety reasons, the 'clear to the sky' policy for bare wires in high bushfire risk areas and 66 kV lines in all areas should be retained and provisions allowing for risk based retention of branches overhanging bare wires in high bushfire risk areas should be discontinued;

The only small businesses affected by the proposed regulations and code are small private landowners such as farmers. However no costs have been identified which would effect farmers disproportionately.

It estimated that the annual cost of developing and updating management plans under proposed reg.9 is $255,032 in 2010/11 (in 2009 dollars) (see Table A3.4 of Appendix 4). On the other hand, the same cost under existing reg.9 is assumed to involve 10% more information requirements and therefore more hours of preparation, estimated to be $306,039 in 2010/11 (in 2009 dollars) (see Table A3.6 of Appendix 4). Therefore, the proposed regulations are expected to reduce administrative burden by at least *$25,504* in 2010/11.

Taking into account Victoria's geographical differences, and in particular the higher risk of bushfires occurring in Victoria, the proposed Victorian regulations are not unduly onerous compared to other Australian jurisdictions. All eastern and southern states impose a requirement on electricity distributors to keep vegetation clear of electric lines, and where clearance spaces are prescribed, they are not significantly different to those that apply in Victoria.

The proposed regulations would not constitute a barrier to entry in any markets where businesses own and operate electric lines. The proposed regulations are therefore unlikely to restrict competition.

In summary, the RIS concludes that that the proposed regulations:

- **are expected to impose costs on major electric companies, Councils, public land managers and private land occupiers;**
- **are expected to confer benefits in terms of minimising risks to public safety and power supplies, and to the conservation of threatened flora and fauna;**
- **are expected to confer the largest net incremental benefits of $917.19m in 2009 dollars as compared to the base case;**
- **would provide approximately $90.75m more *net incremental benefit* – in relation to the 'base case' as compared to the existing regulations and code;**
- **are not inequitable in terms of the distribution of costs and benefits; and**
- **do not restrict competition.**

Table of Contents

Preliminary

This Regulatory Impact Statement (RIS) has been prepared to fulfil the requirements of the **Subordinate Legislation Act 1994** and to facilitate public comment on the proposed Electricity Safety (Electric Line Clearance) Regulations 2010 ('the proposed regulations'). The RIS contains information on:

- the nature and extent of the problem to be addressed by the proposed regulations, including relevant research and investigations;
- the policy objectives of proposed solutions to the problem;
- public consultation to date;
- the case for Government intervention;
- the authorising legislation, objectives, nature and effects of the proposed regulations;
- alternatives to the proposed regulations;
- a cost-benefit analysis of the proposed regulations and alternative policy options;
- National Competition Policy tests; and
- an evaluation strategy.

Public comments and submissions are invited on the proposed regulations, in response to information provided in this RIS. All submissions will be treated as public documents. Written comments and submissions should be forwarded to:

Mr Andrew Padanyi
Legal Officer
Energy Safe Victoria
PO Box 262
Collins Street West VIC 8007
email:apadanyi@esv.vic.gov.au

and must be received no later than 5pm on Tuesday 25 May 2010.

1.0 Background

1.1. Introduction

In Victoria, contact between overhead electric lines and trees can have dire consequences, including bushfires, electrocutions and power loss. Such events can result in deaths, injuries and economic loss. The risks of such events can be reduced to as low as reasonably practicable by maintaining appropriate clearance spaces between overhead electric lines and trees.

Part 8 of the **Electricity Safety Act 1998** specifically requires responsible persons to keep the whole or any part of a tree clear of an electric line. 'Responsible persons' include the relevant distribution companies; occupiers of land, public land managers and VicRoads where there are electric lines; and owners or operators of electric lines.. Table 1 below outlines the category and number of responsbile persons (other than land occupiers) in 2009/10.

Table 1: Category and number of responsible persons in 2009/10[1]

Category of responsible person	Number of Responsible persons
Transmission Businesses	**2**
SP Powernet Pty Ltd Basslink	
Distribution Businesses	**6**
Jemena NE SPI Electricity Pty Ltd Citipower Powercor + Powercor (Docklands) United Energy Distribution (UED) Country Energy	
Other responsible persons under Sec.84 of the Act	**104**
70 councils Melbourne Water Vic Roads Yarra Trams MainCo Parks Victoria Melbourne airport Bendigo Trams Tramway Museum Society of Victoria Ballarat tramway Museum Falls Creek Alpine Resort Management Board Mt Buller Mt Stirling Alpine Resort Management Board Perseverance Corporation Limited 22 Wind farms	
Total	***112***

To achieve this, section 89 of the Act requires that there shall at all times be regulations in place prescribing a code of practice for electric line clearance. The Act also specifies that such regulations have a life of not more than five years. The existing *Electricity*

[1] Details provided by ESV

Safety (Electric Line Clearance) Regulations 2005 ('the existing regulations') will therefore automatically expire on 30 June 2010.

This Regulatory Impact Statement (RIS) assesses the proposed Electricity Safety (Electric Line Clearance) Regulations 2010 ('the proposed regulations'), which are intended to replace the existing regulations on or before their expiry date, with some modifications. The objectives of the proposed regulations are to—

(a) prescribe the Code of Practice for Electric Line Clearance;

(b) prescribe—

(i) management procedures for standards and practices to be adopted and observed in tree cutting or removal in the vicinity of electric lines and the keeping of the whole or any part of a tree clear of electric lines;

(ii) management procedures to minimise danger of electric lines causing fire or electrocution;

(iii) other matters for or with respect to the maintenance of electric lines;

(c) provide for management plans relating to compliance with the Code;

(d) provide for other matters authorised under the Act relating to electric line clearance

Although not part of the RIS cost-benefit assessment, a summary of the differences between the proposed regulations and the existing regulations is given in Part 5.1 and Appendix 1 to this RIS. The modifications to the existing regulations contain improvements recommended by the regulator established by the Act, Energy Safe Victoria (ESV) in consultation with the Electric Line Clearance Consultative Committee (ELCCC) established by section 87 of the Act. These improvements draw on the operational experience of the existing regulations since 2005.

Under section 9(1)(a) of the **Subordinate Legislation Act 1994**, a regulatory impact statement (RIS) is required to be prepared for all proposed regulations (collectively known as 'statutory rules') unless 'the proposed statutory rule would not impose an appreciable economic or social burden on a sector of the public'. This regulatory impact statement (RIS) has been prepared to fulfil this requirement. The cost-benefit assessment in Part 4.0 of the RIS identifies the appreciable economic or social burdens to be imposed by the proposed regulations.

To set the scene for this RIS, and to assist in identifying and describing the problems to be addressed by the proposed regulations, this Part provides some general background information about relevant legislation and policies regarding electricity safety in general, and the proposed regulations in particular. This information is provided solely to assist interested parties in better understanding the nature and effects of the proposed regulations within their legislative, economic and environmental context. It is important to emphasise, however, that the RIS is concerned only with the proposed regulations, and not with the Act or with other instruments made under the Act.

1.2 Relevant legislation, policies and guidelines

The existing regulations and the Code of Practice resulted from the coronial inquest and Royal Commission into the devastating bushfires of 1977 and 1983 respectively. The need for a code of practice in relation to keeping vegetation clear of electric lines was first highlighted in the coronial inquest into the 1977 bushfires conducted by Sir Edward Esler Barber.

The Barber inquiry recognised that electric lines had been the cause of a number of major fires that resulted in extensive injury, loss of life and property damage. The two main reasons for this identified by the Barber inquiry were the lack of maintenance of electric lines, including private electric lines, and the close proximity of vegetation to electric lines. The inquiry concluded that it was imperative that trees and power lines be kept completely separate to avoid the ignition of fires as a result of contact. The inquiry recommended establishing a committee to determine principles and standards for maintaining trees completely clear of electric lines.[2]

Following the catastrophic fires of Ash Wednesday in 1983, the former **State Electricity Commission Act 1958** was amended to:

- designate who is responsible for the maintenance of the clearance space between electric lines and vegetation;
- establish a Tree Clearing Consultative Committee (this committee is referred to as the Electric Line Clearance Consultative Committee in the Electricity Safety Act); and
- provide for a Code of Practice for Tree Clearing, and regulations for the enactment of the code.[3]

A revised form of a voluntary code, developed by the State Electricity Commission (SEC) in consultation with local government, received legislative support in Part VI of the **State Electricity Commission Act 1958** in January 1984. Part VI also made certain persons responsible for keeping trees clear of powerlines (electric lines of up to 66kV), with the SEC and local government being the bodies responsible for the majority of this work in the urban area. The SEC was responsible for the majority of the remainder of the State. [4]

In 1998, the **Electricity Safety Act 1998** was enacted. The purpose of this Act is to make further provision relating to the safety of electricity supply and use and the efficiency of electrical equipment. In introducing the Bill, the Minister stated:

> 'The Office[5] is also responsible for managing the electric line clearance code and liaising with distribution companies, councils and other parties regarding appropriate tree clearing procedures around electric lines. The Office's role in this process is to reduce the risk of bushfires, electric shock and electricity supply interruptions caused by vegetation coming into contact with electric lines, in a manner which is consistent with environmental goals.

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[2] Jaguar Consulting, 2005.

[3] *Ibid.*

[4] *Ibid.*

[5] The former Office of the Chief Electrical Inspector, now Energy Safe Victoria.

> The bill also strengthens the office's powers in relation to compliance by parties with responsibility for electric line clearance pursuant to the code. An electric line clearance consultative committee is continued under the bill to provide advice to the office on the electric line clearance code and any other matter relating to electric line clearance when requested to do so by the office or the minister.'[6]

Energy Safe Victoria (ESV) is Victoria's statutory independent electricity, gas and pipeline safety and technical regulator. ESV was created by the **Energy Safe Victoria Act 2005** through amalgamating the former Office of the Chief Electrical Inspector (OCEI) and the former Office of Gas Safety (OGS).

Amongst other things, the **Electricity Safety Act 1998** ('the Act') assigns ESV the objective of ensuring the electrical safety of electrical generation, transmission and distribution systems, electrical installations and electrical equipment.

The Act also establishes the Electric Line Clearance Consultative Committee (ELCCC) and specifies its membership. Members of the ELCCC have been appointed by the Minister for Energy and Resources, as required by Part 8 of the Act. The ELCCC has representation from the:

- Roads Corporation (VicRoads);
- Country Fire Authority (CFA);
- Electricity distribution companies;
- Electricity transmission companies; and
- Department of Sustainability and Environment (DSE).

Other persons appointed by the Minister to the ELCCC include persons:

- with skills in land management as nominated by the Minister administering the Forests Act;
- representing land owners as nominated by the Minister administering the Dairy Industry Act;
- representing the interests of local government; and
- with environmental or planning expertise as nominated by the Minister administering the Planning and Environment Act.

The ELCCC ensures representation of most persons that are directly affected by the proposed regulations and Code.

Part 8 of the Act specifically requires responsible persons[7] to keep the whole or any part of a tree clear of an electric line. The current Code is prescribed under this Act. Section 89(2) of the Act provides that:

> There shall at all times be in force regulations prescribing the Code but no such regulations shall continue in force for more than 5 years after the date of their coming into operation.

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[6] Treasurer, 1998.

[7] Responsible persons include electricity distribution businesses, land occupiers, public land managers, municipal councils, and VicRoads.

Section 151 of the Act provides that the Governor in Council may make regulations for or with respect to-

> (a) standards of design, construction and maintenance of private electric lines;
>
> (b) the manner in which a distribution company or transmission company may exercise its powers under section 85(b) and (c);
>
> (c) the Code of Practice for Electric Line Clearance setting out-
>
> > (i) the duties of responsible persons;
> >
> > (ii) the standards and practices to be adopted and observed in tree pruning or clearing in the vicinity of electric lines;
> >
> > (iii) management procedures to minimise danger of electric lines causing fire or electrocution;
> >
> > (iv) any other matters for or with respect to the maintenance of electric lines;
>
> (d) requiring responsible persons to prepare and submit to Energy Safe Victoria for approval management plans relating to compliance with the Code and requiring compliance with an approved management plan.

Section 157 of the Act authorises the Governor in Council to make regulations with respect to various matters, including 'any other matter or thing required or permitted by this Act to be prescribed or necessary to be prescribed to give effect to this Act.'

The proposed regulations are to be made under section 157 of the Act.

1.3 Consultation to date

The principal vehicle for consultation in the development of the Regulations has been the Electric Line Clearance Consultative Committee (ELCCC), as required by the Act.[8] The main function of the ELCCC is to provide advice to ESV. Its members are Ministerial appointments, selected to be representative of affected stakeholder groups including landowners; fire authorities; parties that have responsibilities for clearing vegetation (electricity distribution businesses, municipal councils having areas declared under the Electricity Safety Act, etc); and parties with an interest in the preservation of Victoria's native vegetation, and in particular its environmentally and culturally significant vegetation (Department of Sustainability and Environment, Environment Victoria).

In addition, ESV has administratively invited other persons (e.g. a representative of the Energy and Water Ombudsman of Victoria) to attend ELCCC meetings. ESV has received direct input from these members in ELCCC meetings and in direct discussions with individual members. The development of the proposed regulations and Code of Practice has been the principal focus of the ELCCC and of ELCCC working groups since 2007.

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[8] Refer to Part 1.2 of this RIS.

In framing draft regulations, ESV effectively has to balance a number of competing priorities. There is the necessity of ensuring fire and electrical safety (the more vegetation cut away from electricity lines, the better) and minimising the impact on native vegetation and culturally and environmentally sensitive vegetation (the less vegetation cut the better, total avoidance of cutting is best). There is also a balance to be struck in the timing of vegetation cutting - the longer the time between cutting cycles, the lower the costs but the higher the impact on vegetation because of the need to cut back further to allow for the additional regrowth over the longer period until the next cutting cycle. Finally, there is the balance to be struck between an organisation's ability to conduct its cutting works efficiently and without unplanned delays and the legitimate interests of landowners and other persons with concerns about the impact of tree cutting on amenity and environmental values.

Relevant to the considerations above, DSE and Environment Victoria raised the following specific issues and proposals:

- Under other Victorian legislation, permits are required for cutting or removal of native vegetation but compliance with the proposed regulations effectively provides a blanket exemption from these permit requirements. The proposed regulations should therefore ensure that cutting of native vegetation is minimised as far as is consistent with ensuring fire and electricity safety;
- Consultation provisions in the regulations should be extended to include a requirement for consultation in the preparation of work plans and schedules for tree cutting;
- There should be environmental survey crews working ahead of tree cutting crews to ensure that sensitive vegetation is identified and protected.

The electricity distribution businesses raised the following specific issues and proposals:

- The inappropriateness of allowing contact between vegetation and aerial bundled cables (ABC) or other insulated lines on the basis that abrasion or impact and damage from contact with vegetation can be the source of water ingress and failures at a later date;
- That electricity cables with an external plastic coating ('covered conductors') but which do not meet the Australian Standard definition of 'insulated' should not be treated as bare wires for the purposes of the proposed regulations;
- The requirements in the existing regulations for consultation, seeking consent and subsequent notification in the event of failing to obtain consent are cumbersome and cause significant delays to cutting works;
- There is an electricity safety need to reduce vegetation under and adjacent to transmission lines to a greater extent than just the minimum required for avoiding immediate contact between wires and vegetation;

- There is a desire to prevent the planting of ‘inappropriate species’ that would predictably grow into the electricity lines in the future and also an ability to cut or remove ‘inappropriate species’ before they grow into the power lines.

There was also significant ELCCC discussion on:

- Whether there should be any allowance at all for vegetation to overhang bare wires in high bushfire risk areas;
- Whether the ‘clear to the sky’, i.e. no overhanging vegetation, policy should be strengthened by requiring a ‘vee-shaped’ clearance zone above bare wires in high bushfire risk areas; and
- Whether the ‘clear to the sky’ requirements for 66kV lines in low bushfire risk areas should remain.

In relation to the issues above, ESV came to a number of conclusions in framing the draft regulations:

- For fire and electrical safety reasons, the allowance for contact between vegetation and ABC/insulated lines should be discontinued;
- ‘Covered conductors’ should be subject to the same requirements as bare wires;
- For fire and electrical safety reasons, the ‘clear to the sky’ policy for bare wires in high bushfire risk areas and 66 kV lines in all areas should be retained and provisions allowing for risk based retention of branches overhanging bare wires in high bushfire risk areas should be discontinued;
- A ‘vee-shaped’ clearance zone above bare wires in high bushfire risk areas was not justified because the environmental, amenity and economic costs of this proposal were significant and outweighed the marginal reduction in fire and electrical safety risks;
- Traditional transmission line vegetation management practices were appropriate and should be reflected in the new regulations;
- At this time, there is no head of power in the Electricity Safety Act to enable regulations to be made in respect of ‘inappropriate species;’,
- Routine, non-contentious cutting of vegetation should be able to proceed without consultation and consent processes so long as there is adequate notice given to the community to enable reasonable objections to be raised and resolved;
- Consultation processes should be retained in circumstances where vegetation management involves entry of tree cutting crews into private property and cutting or removal of vegetation within that private property;
- Approved electric line clearance management plans should be available and readily accessible to the community;

- There are already existing mechanisms for native vegetation and environmentally and culturally significant vegetation to be progressively identified and recorded in planning overlays and DSE registers and hence these matters do not need to be prescribed in the proposed regulations;
- DSE's existing processes and classifications of particular classes of vegetation, based on Victoria's *Native Vegetation Framework,*[9] are appropriate, and the proposed regulations should be consistent with this Government strategy.

These conclusions are reflected in various sections of the proposed regulations, including but not limited to the removal of some provisions in clauses 9 and 11 of the 2005 Code of Practice. The proposed regulations have been made available to the ELCCC.

ESV has recognised that a number of these matters will involve changes to vegetation management practices and to costs. Because it is not possible to reconcile opposing positions on some of these matters, ESV has framed the proposed regulations in their current form on the basis the above and that its merit can be tested through the RIS and public comment processes as mandated under the Subordinate Legislation Act and the Electricity Safety Act.

ESV has also had direct discussions with representatives of the distribution businesses and the transmission company that collectively own the majority of electric lines within Victoria.

The following organisations were consulted by ESV in October and November 2009 in order to gather preliminary cost data required for RIS purposes:

Major Electric Companies

- *Jemena NE*
- *SPI Electricity Pty Ltd and SP AusNet*
- *Citipower*
- *Powercor*
- *United Energy Distribution, and*
- *Country Energy.*

Local councils

- *Shire of East Gippsland*
- *City of Knox*
- *Shire of Colac-Otway*
- *City of Maroondah*
- *City of Whitehorse*
- *City of Greater Geelong*
- *City of Greater Dandenong*

During consultation, some electricity distribution businesses expressed the view that the requirements in the existing regulations for consultation, seeking consent and subsequent notification in the event of failing to obtain consent, were cumbersome and caused significant delays to cutting works. These delay costs were assessed by ESV not to be

[9] Minister for Environment and Conservation, 2002.

costs of the existing Code but rather costs associated with the electricity distribution businesses'own internal processes. However, notification costs were estimated for both the exisitng and proposed Code for the purposes of the cost/benefit assessment as these are required as per the regulations.

Data regarding notification costs in relation to the proposed Code (clause.5) was given as $5.5m and $0.55m by Powercor and CitiPower, respectively. However, clause 5 of the proposed Code allows responsible persons to notify affected persons via a newspaper advertisment and not as a last resort as in the existing Code. This will provide a much more cost effective alternative for electricity distribution businesses. The RIS estimates that the cost of placing around 18 notices a year for Powercor to be $9,328 and the cost of placing around 8 notices a year for CitiPower to be $4,146. The newspaper advertisment cost assumed a 1/8 page display advertisment in a local newspaper at an average cost of $518.20.

In relation to exisiting Codes 9.2.1 and 9.2.2, electricity distribution businesses also raised the inappropriateness of allowing contact between vegetation and aerial bundled cables (ABC) or other insulated lines on the basis that abrasion or impact and damage from contact with vegetation can be the source of water ingress and failures at a later date.

Furthermore, SP Ausnet provided data regarding additional clearance costs for 81,200 services in light of the omission of clauses 9.2.1 and 9.2.2 in the proposed Code which related to exemptions with respect to small branches less than 10mm and small vegetation (leaves), respectively. The data which they provided included not only the intial cost of re-establishing clearance spaces of $0.6m per annum in light of the omissions, but also the cost of annual trimming including re-visits of $6.2m per annum. This RIS has not factored in the cost of annual trimming because the omission of the aforementioned clauses in the proposed code does not affect the cutting cycle of distribution companies and only results in a one-off re-establishment cost. Powercor provided data regarding 'no breach of clearance distances' and 'no light touching' as $6m per annum and $0.6m per annum for Powercor and CitiPower, respectively. However, additional data later supplied by Powercore and CitPower revealed 68,000 and 43,750 clearance services requiring re-establishment at a per service cost of $83.46 (figure supplied by SP AusNet). Therefore, the annualised one-off cost of omission of clauses 9.2.1 and 9.2.2 was estimated to be $1.07m for Powercor and $0.69m for CitiPower.

There was also significant ELCCC discussion on whether there should be any allowance at all for vegetation to overhang bare wires in high bushfire risk areas. In light of this consultation and discussion, existing *Clause 11.2* is omitted from the *proposed code* meaning that vegetation would no longer be allowed to overhang bare overhead power lines in hazardous bushfire risk areas (HBRAs) under certain conditions. The removal of vegetation directly above the clearance space was not seen as feasible according to SP AusNet 'due to the health and safety risk to personnel attempting to undertake this work…[and]… adverse public reaction'.

According to SP AusNet, in order to meet the requirments of the proposed Code they would have to either 're-construct the lines with insulated cables, or place them

underground or a combination of both'. The one-off capital costs of investment to do this was suggested by SP AusNet to be $17,500 per span.

However, ESV noted that it is no longer necessary in all cases to send a 'man-up the tree' to remove branches in difficult terrain as there is now available helicopter vegetation management technology that can work is such inaccessable terrrain. Secondly, post Black Saturday, 'adverse public reaction' is likely to be significantly different from previously. Therefore it is feasible that a significant proportion of this one off investment could be managed under the proposed Code by a cheaper alternative. SP AusNet provided a figure of $17,500, however given the expert opinion of ESV that it is cheaper than $17,500 an average of 50% of $17,500 per span is taken to be more representative of the costs imposed by the regulation. The figure supplied by SP AusNet was $30-$40m for the one of capital investment in their network. However, data provided by SP AusNet regarding the number of spans affected (i.e. 2000) and the average one-off cost of investment per span of $8,750 (i.e. 50% of $17,500 noted by SP AusNet) revealed an annualised cost of $3.5m and a 5-year cost of $15.8m. Powercor provided a one-off cost estimate of $0.22m per annum regarding this matter however considering that there are only 20 spans affected the annualised cost is calculated in this RIS to be $35,000 or $0.16m over 5 years.

All relevant comments have been taken into account in drafting the proposed regulations. Some stakeholders expressed a preference for certain aspects of the existing regulations to be retained, and this is reflected in the discussion of alternatives to the proposed regulations in Part 3.0 of this RIS.

The proposed regulations are required to be open for public comment for a period of ninety days in accordance with section 89 of the **Electricity Safety Act 1998**. This period will coincide with the publication of this RIS. The RIS will be advertised on the ESV website, in daily newspapers, and hard copies will be sent to the stakeholders listed in Appendix 1. It is also proposed that the availability of the RIS will also be advertised in the Government Gazette.

2.0 The problem and the policy objective

2.1 The nature and extent of the problem

In accordance with Government guidelines,[10] a Regulatory Impact Statement (RIS) is required to identify and describe the problems to be addressed by the proposed regulations. *In other words, why are the regulations being proposed?*

The provisions of the Act indicate an intention by the Parliament that certain matters of detail in the overall legislative scheme would be prescribed by regulation rather than by the Act, in accordance with the guidelines issued under the **Subordinate Legislation Act 1994**. These guidelines state that—

> Primary legislation is usually drafted in general rather than specific terms with a view to avoiding the need to make frequent changes. Matters of detail liable to frequent change should, where possible, be dealt with by subordinate legislation rather than primary legislation. However, the

[10] Government of Victoria, 2007.

> rule is that matters of policy, general principle and the like should be reserved to primary legislation.

The guidelines further state that the following matters are more appropriately dealt with by subordinate legislation than by primary legislation-

(a) matters relating to detailed implementation of policy, general principles and standards (rather than the policy, principle or standard itself);

(b) prescribing fees to be paid for various services;

(c) prescribing forms (if it is necessary that they be prescribed) for use in connection with legislation; and

(d) times within which certain steps should be taken.[11]

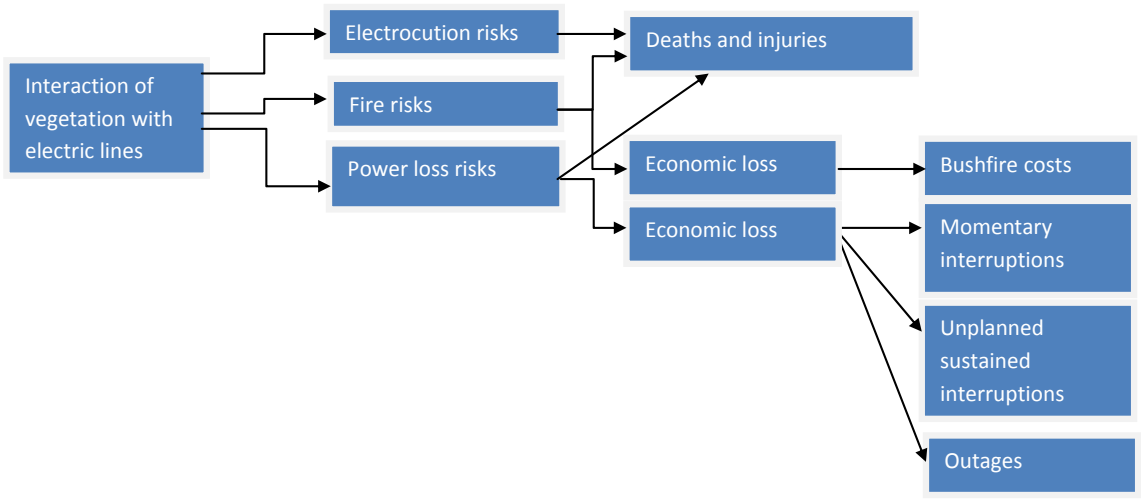
For sunsetting regulations, the problems to be addressed by the regulatory proposal are normally identified using a base case assumption of no replacement regulations.[12] However, as outlined in Part 1.2 of this RIS, in the case of the current regulatory proposal, the Act requires that 'there shall at all times be regulations in place prescribing a code of practice for electric line clearance'. The normal base case assumption for sunsetting regulations would therefore be infeasible in this particular case. Nevertheless, it is conceivably possible that regulations could be made that comply with the legal requirements of the Act, but which are inadequate in addressing the problems relating to electric line clearance. The following identification of problems is therefore made against a base case of inadequate regulations, rather than no regulations (refer to Part 4.2 of this RIS). However, although the base case is not the existing regulations, some comparisons have been made with the existing regulations for ease of illustration.

The problems are discussed in some detail later in this part of the RIS, but generally arise in relation to the following specific sources of risk arising from contact between electric lines and trees or other vegetation:

1. Extreme risks to public safety and property from bushfires;
2. Severe risks of loss of power supplies;
3. Safety risks to individuals from electrocution; and
4. Environmental risks from overcutting or excessive removal of vegetation.
5. Risks of inadequate notification and consultation.

Each of the first three risks can result in deaths and injuries, if not adequately managed. Fire risks and power loss can also result in economic loss. The relationships between these risks and resulting consequences can be illustrated by the following flow chart:

[11] Guidelines under Section 26 **Subordinate Legislation Act 1994** (effective 17 January 2005) Guideline 1.09.
[12] Victorian Guide to Regulation, 2007.



The market failure associated with these problems is discussed in Part 2.3 of this RIS.

2.1.1 What can happen when trees contact electric lines?

Victoria has an extensive electricity transmission and distribution system that covers most of the state. The *transmission* system comprises approximately 6,600 kilometres of overhead electric lines supported mainly by tower structures. These transmission lines typically operate at voltages between 132,000 and 500,000 volts. The transmission line system interconnects Victoria with New South Wales and South Australia as well as connecting electricity generators with the major consumption centres across the State.[13]

The electricity *distribution* system comprises 130,000 kilometres of low voltage and high voltage overhead electric lines that operate at voltages between 240 volts and 66,000 volts. These power lines are, for the most part, located on over 1.2 million overhead pole structures. The distribution system serves over 2.2 million electricity customers within Victoria.[14]

Discharge of electricity from an electric line can occur when contact is made with the line, including contact with branches or leaves of trees. In the case of a high voltage line, actual contact is not required, as the electricity will discharge through the air. This is commonly known as a 'flashover'. In the case of a transmission line the distance that must be kept clear from the electric line can be measured in metres. The magnitude of the electrical discharge that will occur due to contact or close proximity with the line varies with atmospheric conditions. However, electrical discharges can cause serious, if not fatal, injury to persons and animals and is likely to cause a fire if the discharge is through combustible material, such as tree branches and leaves. Electrical discharges through metal, including the clashing of electric line conductors, can result in molten

[13] *Ibid.*
[14] *Ibid.*

metal and sparks being formed. This molten metal and resulting sparks can result in ignition of combustible material in the vicinity of, or underneath, the electric line.[15]

In the case of a transmission line, the presence of thick smoke will result in the air becoming conductive and the distance that the electricity can travel through the air is greatly increased. In thick smoke it is possible for electricity to discharge directly from the transmission line, through the smoke-laden air to the ground or a structure. This presents a serious risk to any person in the vicinity of a transmission line when there is a fire.[16]

As discussed during the consultation process,[17] trees (including even small branches) interacting with electric lines can also damage the lines. For example, the insulation on insulated cables can be damaged, often resulting in arcing over the insulation and the ignition of fire, or the breaking of the cable resulting in a live cable resting on the ground. Any person or animal coming into contact with, or approaching close to the live cable could be seriously or fatally injured.[18]

Branches or whole trees falling vertically on to electric lines can have similar effects as the horizontal contacts discussed above, with an even greater risk of cables breaking or being pulled off their insulators.

For these reasons, it is essential to prevent any contact between any part of a tree and a powerline, whether that involves branches or leaves touching, branches dropping or trees falling.

2.1.2 Extreme risks to public safety and property from bushfires

Prior to the introduction of tree clearance legislation and code of practice in 1984, the interaction between vegetation and electrical lines had historically been a major cause of fires. The devastating fires of 1962, 1969, 1972 and 1977, as well as the Ash Wednesday fires of 1983 were all, at least in part, caused by electric lines contacting surrounding vegetation. The Ash Wednesday fires at East Trentham and Mount Macedon were attributed to powerlines arcing when they came into contact with trees. This fire alone resulted in seven fatalities, the loss of 157 houses, 628 other buildings, 7,700 head of cattle or sheep and an area of over 29,000 hectares being burnt.[19]

On 16 February 2009, the 2009 Victorian Bushfires Royal Commission was established to investigate the causes and responses to the devastating bushfires which swept through parts of Victoria in late January and February 2009. In the preface to their August 2009 interim report, the Royal Commissioners stated:

> 'Fire is a recurrent visitor in Australia's environmental history. The flora and topography in Victoria render it one of the most bushfire-prone parts of the planet. Even with this history, 7 February 2009 was a day of unprecedented tragedy in the State. One hundred

[15] *Ibid.*
[16] *Ibid.*
[17] Refer to Part 1.3 of this RIS.
[18] Jaguar Consulting, 2005.
[19] Jaguar Consulting, 2005.

> and seventy-three people died in one of the worst bushfires in Australian history. About 430,000 hectares of land were burnt, along with 2000 properties and 61 businesses. Entire towns were destroyed and around 78 communities were affected. The impact of these fires is seared into the consciousness of those who lived through them.'[20]

However, this Royal Commission has not yet made any findings as to the causes of these bushfires.

Evidence in support of the Royal Commission's above statement about Victoria having one of the most fire-prone environments in the world is contained in Chapter 2 of the *Report of the Inquiry into the 2002-2003 Victorian Bushfires.*[21] This situation is due to the combination of Victoria's landscape and vegetation with climate and weather conditions, combined with its high population density relative to other States. A study in 1986[22] estimated that in the past 100 years, more than two thirds of Australian bushfire-related deaths and more than half of the significant bushfire related property losses occurred in Victoria. This is despite the total area of Victoria being only three per cent of Australia's total land area.

The costs of Victorian bushfires can be partially quantified using insurance claim payouts obtained from the Emergency Management Australia (EMA) Disasters Database, fire suppression and recovery costs and costs to commercial industry. However, these costs are only proxy measure of the total cost of bushfires, because they do not include other costs such as loss of life, injury, loss of livelihood or emotional loss. Table 2.15 in Appendix 2 to this RIS provides details of significant bushfires in Victoria since the introduction of tree clearance legislation and code of practice in 1984 and the total amount of insured cost. The estimated total costs of these bushfires (from all causes) is given below as $1.47b:

	Lives lost	Injured	Livestock destroyed	Homes destroy-ed	Bldgs destroyed	Area Burnt ha.	Total estimated cost $m (2009 dollars)[23]
Total	**193**	**1,456**	**293,188**	**2,389**	**3,709**	**3,170,494**	**1,469.2**

Power transmission lines and ignitions from trains are considered to be the cause of 1% of bushfires between 1976/77 and 1995/96[24] as shown in Table 2 (reproduced from Table A2.14 of Appendix 2) and are responsible for up to 14% of the total area burnt. For the purposes of this RIS, the term 'Public Utilities' (i.e. ignitions from trains and power transmission) is used as a proxy category for the number of bushfire events and extent of damage caused by the interaction of vegetation and electric lines (1984 to 1999)[25].

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[20] 2009 Victorian Bushfires Royal Commission, August 2009, p.V.
[21] Esplin, Gill and Enright, 2003
[22] Hickman and Tarrant, 1986 in Esplin, Gill and Enright, 2003
[23] All figures are adjusted using Melbourne CPI indices (See ABS (June 2009), Consumer Price Index, Cat. No. 6401)
[24] ABS (2004) - Year Book Australia, Cat. No.1301.0 More recent ABS statistics are unavailable.
[25] The code of practice which is part of the 'base case' was introduced in 1984

Table 2: Causes of bushfires in Victoria (1976/77 to 1995/96)

Fire cause	Average no. of fires/year	% of total fires	Average area burnt ha/yr	% of total area burnt
Lightning	149	26	53,096	46
Deliberate	145	25	15,649	14
Agricultural	96	16	7,799	7
Campfires	59	10	1,466	1
Cigarettes/matches	41	7	444	<1
Cause unknown[(a)]	37	6	2,974	3
Miscellaneous[(b)]	26	5	10,009	9
Machinery/exhausts	15	3	2,551	2
Prescribed burn escapes[(c)]	9	2	5,274	5
Public utilities[(d)]	7	1	16,256	14
Total[(e)]	**584**	**100**	**115,518**	**100**

Notes:
(a) Includes fires where investigators could not ascertain the cause, as well as fires where the cause was not investigated.
(b) Includes causes like: burning houses, burning buildings and fireworks.
(c) Management of parks and forests includes the use of planned fires for a variety of purposes such as natural fuel management and the maintenance of flora and fauna habitat. Sometimes these fires burn beyond the planned perimeter.
(d) Includes ignitions from trains and power transmission.
(e) All figures are rounded; hence may not add up to column totals.

Source: ABS (2004) - Year Book Australia, Cat.no. 1301.0

Given that the proportion of the '14%' represented by the interaction of vegetation with electric lines is unknown, only 50% of this proportion is considered to be relevant to electric lines (i.e. 7%). Using a pro-rata approach, the cost of fires including: insured cost; loss assessment cost and commercial industry cost; and fire suppression and recovery costs for the years 1985 to 2009 (i.e. over 22 years) would amount up to $102.85 million (2009 dollars) or an annual cost of $4.67 million.

In an earlier estimate, the cost of fires caused by contact between vegetation and electric lines in the years 1975 to 1983 (prior to the introduction of the current tree clearance legislation and code of practice) was $184 million[26]. The 2009 dollar equivalent of these costs would be approximately $560 million. This is equivalent to an annual cost of $93.3 million.

On the basis of these estimates, the cost of Victorian bushfires caused by interactions between vegetation and electric lines has been reduced by at least 95% since the introduction of tree clearance legislation and code of practice in 1984. Successive versions of the regulations and the Code have therefore shown to be highly successful in reducing the incidence of bushfires due to contact or close proximity between vegetation and electric lines.

[26] Jaguar Consulting, 2005

2.1.3 Severe risks of loss of power supplies

There are severe risks associated with the loss of power supplies, whether caused by fire or by trees falling on to electric lines, thus causing power losses with or without fire. Possible consequences of power loss include loss of production, communications, closure of workplaces and schools, loss of air-conditioning in high temperatures etc. For example:

> 'The loss of a transmission line can result in hundreds of thousands of customers losing their electricity supply, depending on the circumstances at that time. In the worst case, should a couple of transmission lines be lost during the peak summer electrical load period, the electricity supply to the whole state could be threatened'.[27]

Power losses during the bushfire season also restrict the fire suppression and community warning capabilities.

SP AusNet and United Energy reported vegetation and animals as the second or third most important causes of interruptions, together accounting for 35 per cent of their respective total outages[28]. Powercor noted in 2000 that outages due to vegetation were not reducing and that the 'inability to get vegetation trimmed in a timely manner by local Shires in non-bush fire areas is likely to be impacting on supply reliability'[29]. These factors are likely to cause both unplanned sustained interruptions and momentary interruptions (interruptions less than 1 minute).

With regard to electricity distribution, the total number of hours of momentary and unplanned sustained interruptions in an unregulated environment is estimated to be 793,309[30] hours per annum. The loss of load in terms of kW per hour of interruption is assumed to be a weighted average of 13.54kW. The value of unserved energy (VUE)[31] for momentary and unplanned sustained interruptions due to vegetation is estimated to be ***$561.17 million***[32] per annum (see Table A2.6 of Appendix 2).

The electricity transmission system of Victoria is owned and operated by SP AusNet. The value of unserved energy (VUE) for transmission outages in an unregulated environment is estimated to be approximately ***$212.68 million***[33] per annum (see Table A2.16 of Appendix 2).

Trees can also prevent access to power lines for maintenance work, especially during emergencies, causing delays to power restoration.[34]

The ESC has recommended that measures and ratings applied to the 'health card' for electricity distributors be used as indicators of, amongst other things, the effective

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[27] Jaguar Consulting, 2005
[28] Essential Services Commission (April 2004)
[29] Powercor (September 2000)
[30] This reflects the risk of only a 1% increase the proportion hours of momentary and unplanned sustained interruptions affected by the interaction of vegetation with electric lines in an unregulated environment.
[31] See Part 2.1 of Appendix 2 in this RIS for a detailed discussion and description
[32] 13.54kW x 793,309hrs x $52.24/kWh = $561.17m
[33] This reflects the risk of only a 1% increase the proportion hours of outages affected by the interaction of vegetation with electric lines in an unregulated environment.
[34] *Ibid*.

implementation of vegetation management plans[35]. Field observations found that having management plans is an effective process with only 'a few instances of trees growing near to power lines'.[36] Importantly the management plan sets out a monitoring strategy for vegetation management[37] and are seen a risk-based approach to compliance with the code of practice and regulations[38].

2.1.4 Safety risks to individuals

Apart from the abovementioned risks to Victorian communities, there are risks to individuals of electrocution as a result of vegetation contact with electric lines e.g.

- children climbing trees then touching electric lines;
- people touching trees with wet bark;
- trees or branches falling across power lines, breaking them or pulling them off their insulators;
- flashovers and power surges damaging electrical appliances and creating danger for people touching any appliances at the time.[39]

Damage to an insulated cable, particularly cables servicing customers' premises, can result in metal, including gas and water pipes within the premises, becoming 'live', or causing the passage of large currents through the electrical earthing system within the premises. This can result in a serious or fatal electric shock to a person or animal inside or outside the premises, or cause the premises to catch fire.[40]

2.1.5 Environmental risks

Victoria's *Native Vegetation Management – A Framework for Action*[41] establishes the strategic direction for the protection, enhancement and re-vegetation of native vegetation across the State. The Framework addresses native vegetation management from a whole of catchment perspective but necessarily focuses primarily on private land where the critical issues of past clearing and fragmentation exist.

There are risks to native flora and fauna from possible overcutting or excessive removal of vegetation, when maintaining clearance spaces from electric lines. For consistency with the Government's Native Vegetation Framework, there is a need to restrict cutting or removal of native vegetation or vegetation of cultural or environmental significance to the minimum extent necessary to comply with the Code or to make an unsafe situation safe.

There is also a legislated requirement under the **Flora and Fauna Guarantee Act 1988** to protect vulnerable, endangered or critically endangered faunal species. For example,

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[35] Essential Services Commission (October 2005)
[36] Powercor (September 2000)
[37] Ibid 2000
[38] Singapore Power (21 October 2004) *TXU Networks Electricity Distribution Price Review 2006 Price-Service Proposals for the Period 2006-2010*
[39] SA brochure.
[40] Jaguar Consulting, 2005.
[41] Minister for Environment and Conservation, 2002.

cutting or removal of trees should be undertaken outside of breeding seasons wherever practicable.

2.1.6 Risks of inadequate notification and consultation

The underlying philosophy of the regulations and the Code of Practice is to balance the public interest in community safety and reliability of electricity supply with the public interest in amenity and conservation of the environment. If notice of intended cutting or removal trees was not given, there would be little or no opportunity for affected persons to raise objections and to communicate with responsible persons about the intended method and/or scope of cutting, which would fundamentally undermine that balance.

The entry into private property without notice could potentially result in conflict between land occupiers and responsible persons, including the agents, employees or contractors of responsible persons. Notification and consultation also enables land occupiers to make the necessary arrangements for the entry of workers on to their land, such as unlocking gates and/or moving livestock to a different paddock. It also enables land occupiers to be present during the cutting or removal if they so wish.

Where an affected person objects, a dispute resolution procedure – which is another feature of the Code – needs to be invoked to resolve the dispute.

However, as discussed during the consultation process for the proposed regulations,[42] there is a need to avoid delays to essential cutting, especially in high bushfire risk areas during the bushfire season. For example, clause 3 of the existing Code requires a responsible person to either obtain permission from or give 14 days notice the relevant land occupier or owner (as the case requires); or failing this to give 21 days notice via a newspaper advertisement. This means that it may take up to 21 days delay before being able to cut trees that are observed to be either already in contact or likely to soon come into contact with electric lines. Electricity distribution businesses have advised ESV that the requirements in the existing regulations for consultation, seeking consent and subsequent notification in the event of failing to obtain consent are cumbersome and are causing significant delays to cutting works.

An appropriate balance therefore needs to be struck between ensuring adequate notification and consultation on the other hand, and minimising risks to public safety and property on the other.

2.1.7 Risk analysis

When considering the need for government intervention, both the risk of incidence of problems and the likely impacts if such problems do occur, are relevant. For example, contact between only one tree and an electric line could start a major bushfire result in hundreds of deaths or injuries. High public safety impacts generally justify stronger regulatory instruments, even if the incidence of such events may be low. Conversely, where there are low impacts, less interventionist forms of regulation, including self-regulation, may be considered.

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[42] Refer to Parts 1.3 and 5.2 of this RIS.

Table 3 analyses both the likely incidence and impact of various problems occurring in the absence of adequate regulations or other effective alternatives. Because the absence of electrical safety regulation is hypothetical, this analysis is necessarily based upon subjective, yet informed predictions by ESV on the basis of accumulated electrical safety knowledge and experience. The purpose is only to give a high-level illustration of the variations in both the incidence and impact of likely problems in the absence of regulations or effective alternatives.

Table 3: Problem risk analysis

Nature of risk	Likely incidence	Likely impact	Further information
Risks to public safety and property from bushfires.	High	Extremely high	**Part 2.1.2**
Risks of loss of power supplies.	High	Very high	**Part 2.1.3**
Safety risks to individuals from electrocution	Medium	Very high	**Part 2.1.4**
Environmental risks from overcutting or excessive removal of vegetation.	Medium	Medium	**Part 2.1.5**
Risks of inadequate notification and consultation	Medium	Medium	**Part 2.1.6**

2.1.8 Relationship of problems to proposed regulations and other options

The focus of the above analysis is necessarily on the likely problems compared to the base case of hypothetically inadequate regulations. Possible solutions to these problems, such as the proposed regulations and other options, are more appropriately discussed at some length in Parts 3, 4 and 5 of this RIS.

Nevertheless, the relationship between these problems and their possible solutions may not be readily apparent to readers outside the electricity distribution industry. For this reason, Table 4 below lists the main cost items entailed in the proposed regulations and other options, and directs the reader to the relevant parts of the RIS where the need for such cost items is discussed

Table 4: Comparison of compliance costs of existing and proposed regulations or other options

Description of compliance cost item	Purpose of item	Parts of RIS demonstrating need
Development of management plans by 'other'[43] responsible persons under sec.84 of the Act	To demonstrate competence and compliance with the Code as a whole	2.1.2, 2.1.3, 2.1.4, 2.1.5, 4.3, 5.1, 5.2
Updating management plans transmission businesses	To demonstrate competence and compliance with the Code as a whole	2.1.2, 2.1.3, 2.1.4, 2.1.5, 4.3, 4.4, 5.1, 5.2
Updating management plans	To demonstrate competence and	2.1.2, 2.1.3, 2.1.4, 2.1.5, 4.3, 4.4,

[43] Not including electricity distribution and transmission businesses

Description of compliance cost item	Purpose of item	Parts of RIS demonstrating need
distribution businesses	compliance with the Code as a whole	5.1, 5.2
Updating management plans other responsible persons under sec.84 of the Act	To demonstrate competence and compliance with the Code as a whole	2.1.2, 2.1.3, 2.1.4, 2.1.5, 4.3, 4.4, 5.1, 5.2
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses	To enable land occupiers to object or to make entry arrangements	2.1.6, 4.3, 5.1, 5.2
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses	To enable land occupiers to object or to make entry arrangements	2.1.6, 4.3, 5.1, 5.2
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act	To enable land occupiers to object or to make entry arrangements	2.1.6, 4.3, 5.1, 5.2
New development of dispute resolution procedures	To resolve disputes between responsible persons and objectors	2.1.6
Auditing costs for ESV	To enable ESV to monitor adequacy compliance with management plans	4.3, 5.1.3, 5.3
Cost of omitting clauses 9.2.1 and 9.2.2 of existing code (small tree branches) to electricity distribution companies	To ensure that small tree branches do not cause the identified problems	2.1.1, 2.1.2, 2.1.3, 2.1.4, 5.2
Cost of omitting clause 9.2.1 and 9.2.2 of existing code (small tree branches) to other responsible persons under sec.84 of the Act	To ensure that small tree branches do not cause the identified problems	2.1.1, 2.1.2, 2.1.3, 2.1.4, 5.2
Cost of omitting clause 11.1 of existing code (overhanging tree branches) to electricity distribution companies	To ensure that overhanging tree branches do not cause the identified problems	2.1.1, 2.1.2, 2.1.3, 2.1.4, 5.2

2.1.9 Appropriate penalties

Finally, appropriate penalties[44] need to be prescribed in regulations made under the Act, to ensure that the regulations are enforceable. (Information about prosecutions and other enforcement matters is given in Part 5.3 of this RIS).

The problems described above obviously lie at the more severe end of the scale of problems commonly addressed by regulatory proposals. For this reason, it is appropriate that the regulations prescribe penalties that are commensurate with the gravity of the offences and their potential consequences.

For example, under the existing regulations, the penalty prescribed for failure to prepare a management plan [10 penalty units[45] (i.e $1,168.20 in 2009/10) under subregulation 9(3)]

[44] The reason that penalties are not included in Table 4 is that penalties are a cost of non-compliance, rather than a compliance cost.

is significantly lower than the penalty prescribed for failure to comply with the management plan [20 penalty units (i.e. $2,336.40 in 2009/10) subregulation 9(4)].[46] This difference is inconsistent with the view that not having a management plan at all is likely to have worse consequences than the failure to comply with a part of a management plan. Management plan requirements help to safeguard public safety and the reliability of power supplies, and it is appropriate that the penalties reflect their importance to the greatest available extent.

Whilst the risk of prosecution and conviction is itself likely to act as a greater deterrent than these relatively minor penalties, especially for large electricity companies, the opportunity to correct such anomalies should be taken whenever regulations are being remade.

2.2 Policy objective

Having regard to purposes of the Act and the above identification of the problems, the following overarching policy objective is therefore proposed for the purposes of this RIS:

To reduce to as low as reasonably practicable the risks of:

- *fire, electrocution and power loss; and*
- *consequential deaths, injuries and economic loss;*

as a result of vegetation coming into contact with electric lines.

The words 'as low as reasonably practicable' are interpreted to include 'within reasonable costs' plus adequate and reasonable conservation of native flora and fauna (refer to Part 2.1.5 of this RIS).

The main test for assessing the proposed regulations against the practicable alternatives is their relative net benefit in achieving this policy objective.

While necessarily narrower in scope, this policy objective is consistent with the objects of ESV as set out in the Act, as discussed in Part 1.2.2 of this RIS.

2.3 Need for intervention

Having identified the nature and extent of the problems and the policy objective, the 'threshold' or preliminary question to be addressed in an RIS is: *Is there a sufficient case for further government intervention to assist in solving the problems?*

There is a clear economic case for government intervention in markets where some form of **market failure** is taking place. Government can justify this by saying that intervention is in the public interest. Basically, market failure occurs when markets fail to deliver an efficient allocation of resources (economic efficiency). The result is a loss of economic and social welfare. The relevant sources of market failure addressed by the proposed regulations are those associated with **public goods** and **externalities**. In other words, market forces alone would not be expected to solve the problems identified in Part

[45] For the 2009/10 financial year, the value of one penalty unit has been set by the Treasurer at $116.82.
[46] Under section 157(3) of the Act, 20 penalty units is the maximum penalty that can be imposed for a breach of the regulations.

2.1 of this RIS and intervention in the form of regulations or other effective alternatives is necessary.

Public safety, a functioning economy (including community services) and conservation of native and significant flora and fauna are prime examples of **public goods.** Consumption of the benefits of such public goods by one individual does not reduce the amount of benefits available for consumption by others. A market solution will fail to provide or provide sufficient levels of the public good because of free riding. That is to say, there would be no way for the provider to keep those who do not pay for the public good from enjoying the benefits of that good. In this case, public safety and environment protection would be provided by markets to some extent because it is in the interests of owners and/or operators of electric lines to protect capital assets from damage.[47] Electric companies and land occupiers would have an incentive to ensure their business operations are not interrupted due to problems arising from inadequate clearance between trees and electric lines. However, these incentives are unlikely to be sufficient to protect public safety and environment as the damage to the public and environment as a result of major incident can often be far more than the damage to the electric line itself and potential loss of business revenue (refer to Part 2.1 of this RIS).

However, it could be argued that persons (including corporate persons) are subject to a duty of care under common law. The duty requires a person to take reasonable precautions against a risk of harm in cases where that risk of harm is foreseeable (that is, it is a risk that the person knew or ought to have known). A person who fails to take reasonable precautions against such risks is negligent.[48] In the absence of the proposed regulations, it may be suggested that the duty discussed above would provide an incentive to the owners and/or operators of electric lines to take positive steps to prevent the interaction of lines with vegetation. The rationale for this is that the fear of liability would compel responsible persons to take (as a minimum) the safety precautions that cost less than the accidents they prevent.[49] In addition to wanting to avoid potential litigation, electricity companies and farmers would have an incentive to ensure their operations are not interrupted due to power loss or other consequences of inadequate tree clearance.

However, the factors referred to above would fail to adequately address the problems that the proposed regulations seek to address. Firstly the ability to totally safeguard against the risks of vegetation interacting with electric lines – undergrounding the assets – was disallowed by the Essential Services Commission in the 2006-10 price review for electricity distribution. This was due to concerns for consumer access to energy and prices. The market would be restricted in its ability to total safeguard against such risks in this manner. Secondly, in an environment where *overhead electric lines* continue to exist, voluntary risk management would not be adequate in providing sufficient public safety, economic activity, and conservation. A consultative collaborative effort, as allowed for by the proposed regulations, would be needed to ensure 100% compliance and a 'reasonably practicable' minimisation of risks. The law of negligence would not provide the necessary incentives to adequately manage the risks of interaction of

[47] Tim Harding & Associates in association with Rivers Economic Consulting, 2006.

[48] Wrongs Act 1958 (Vic), Division 2 of Part 1.

[49] Abel, 1990.

vegetation with electric lines. As discussed earlier in this RIS, contact between only one tree and one electric line could start a bushfire, with devasting consequences to lives and property.

Externalities arise where private decision makers do not incur all the costs or receive all the benefits of their decisions. Negative production externalities, arising from the cutting and removal of vegetation, may result in the over destruction of native trees and flora of ecological, historical, cultural or environmental significance. Removal or cutting of a habitat tree may also cause breeding problems to fauna which is endangered or critically endangered. This would lead to 'social costs' which are greater than the private costs of cutting and removal activity. Such activity would have negative consequences for the state of Victoria with too few resources being allocated to conservation as discussed earlier under 'public goods'.

Corporate owners of electric lines are obliged under corporations law to act in the interests of the company's shareholders. It is acknowledged that shareholder interests have changed over time placing greater emphasis on corporate and social responsibility in order to meet more sophisticated consumer preferences including environmental demands. However such an emphasis remains voluntary and would not be expected to internalise all third party social costs.

3.0 IDENTIFICATION OF VIABLE OPTIONS

The purpose of this part of the RIS is to identify practicable or feasible alternatives to the proposed regulations for comparative cost benefit assessment in Part 4.0 of the RIS. If alternatives are not practicable or feasible, then there is no point in considering them further in terms of costs and benefits.

The RIS is required to identify practicable alternatives to the proposed regulations and their relative costs and benefits compared to the proposed regulations. Conversely, the RIS is not required to identify alternatives which are not practicable, or which are beyond the scope of the authorising legislation. No alternatives are required to be identified, nor are costs and benefits required to be assessed where there is no appreciable cost burden imposed on any sector of the public.

A threshold issue is whether it is feasible to eliminate the issue of interference between electric lines and vegetation by placing all electric lines underground. It is increasingly the case that new distribution lines are placed underground, as there are several benefits other than fire safety attained from making such a change, including aesthetic benefits. However, the existing electric line network across Victoria is so vast that even if heavily funded, little impact could be achieved during the life of the proposed regulations. The cost of placing all electric lines underground would be extremely high. It is currently thought that the cost of undergrounding existing overhead electric lines would be well in excess of $10 billion. Additional costs over and above this figure would be involved for every house, factory or office to have their existing overhead service lines installed underground. Moreover, electric lines operating at 66,000 volts and above are not included in this indicative cost. Clearly, this does not constitute a feasible alternative in

the current context, though a progressive shift toward undergrounding lines may be expected to occur in the longer term.[50]

In any case, the financing of the placement of existing electric lines underground would entail an increase in electricity prices, which could not be introduced without approval from the independent electricity price regulator (formerly the Essential Services Commission, now the Australian Energy Regulator). Previous applications to increase electricity prices for this purpose have been rejected, even in high risk areas.[51]

Some of the proposed regulations are **more prescriptive than performance-based**. Performance-based regulations simply specify the required outcome, rather than what needs to be done to achieve the required outcome. They are not suitable in all circumstances and are most suitable where flexibility and choice in strategies is desirable, to encourage innovation and efficiency. However, performance-based regulations can sometimes be more difficult to comprehend and can also be more difficult to enforce for evidentiary reasons. By their nature, performance-based regulations tend to focus on the resulting outcome of the activity in question, rather than taking action necessary to avoid or prevent such outcomes. As discussed in Part 2.1 of this RIS, the failure to take adequate preventative action could have extremely serious and irreversible consequences, such as multiple deaths and, injuries, or major economic loss. An appropriate balance therefore needs to be struck between preferences for performance-based regulations, ease of comprehension and ease of enforcement. For this reason, regulations that are solely performance-based would not be a feasible alternative for this RIS.

As discussed in Part 1.2 of this RIS, there is no legislation other than the **Electricity Safety Act 1998** that deals with the identified problems. Thus there are no feasible alternatives available involving the use of other legislation.

It is normal practice in an RIS to consider at least one alternative that does not entail the making of regulations, that is, a non-regulatory alternative such as an unprescribed code of practice or guidelines. However, in this RIS, because of section 89(2) of the Act, which requires that regulations prescribing the Code to be at all times in force, there cannot be a non-regulatory option in this case. Attention is also drawn to section 82(1) of the Act, which provides that a provision of this part of the Act (including section 89) prevails over any other inconsistent legislation, which would include the **Subordinate Legislation Act 1994** and guidelines made under that Act. These provisions clearly provide strict limits on the range of feasible alternatives that can be considered.

As set out in Part 4.2 of this RIS, the base case therefore includes not only the provisions of the Act, but also regulations that prescribe the Code. However, it is conceivably possible that these base case regulations could impose no costs and confer no benefits, such as regulations that did no more than prescribe a code that specifies the clearance spaces needed to comply with section 84 of the Act (which requires responsible persons, as defined, to keep the whole or any part of a tree clear of electric lines).

In lieu of a non-regulatory option, a minimum regulatory option would be a step above the base case, that is regulations that simply prescribed the whole of the proposed Code,

[50] Jaguar Consulting, 2005.

[51] Essential Services Commission, October 2005.

but did not include any other aspects of the proposed regulations, such as prescribed penalties, management plans or exemptions. This minimum regulatory option will be considered in this RIS as **Option A**.

Another feasible option could be to remake the existing regulations and the existing code, especially as some stakeholders have expressed a preference for retaining certain aspects of the existing regulations and/or the existing code.[52] This alternative will be considered in this RIS as **Option B.** The main differences between the existing and the proposed regulations are outlined in Parts 5.1 and 5.2 of this RIS. Briefly, under the existing regulations and the existing code:

1. All responsible persons (except for land occupiers), rather than only major electric companies,[53] need to submit their management plans to ESV for approval;
2. The definition of environmentally or culturally significant vegetation is less specific, and the advice of a qualified arborist or horticulturalist must be obtained before pruning or clearing;
3. Clearance spaces surrounding aerial bundled cable or insulated cable do not apply to small tree branches under specified conditions;
4. Minimum clearance spaces surrounding powerlines in hazardous bushfire risk areas do not apply to tree branches above a powerline of 22,000 volts under specified conditions;
5. Responsible persons must negotiate agreements rather than notify and consult with occupiers or owners of private land before cutting or removing trees.[54]

Although not a major difference, especially for large electricity companies, the penalty for breach of one of the existing regulations [Regulation 9(3)] is 10 rather than 20 penalty units as in the equivalent proposed regulation 9(4).[55]

A feasible variation of Option B would be to make the proposed regulations with the existing code. This alternative will be considered in this RIS as **Option C. Option C** would largely be the same as Option B, except that only major electric companies,[56] would need to submit their management plans to ESV for approval.

The proposed regulations with the proposed code (as settled by Parliamentary Counsel) will be considered in this RIS as **Option D.**

As a major cost of the proposed regulations and code is the notification and consultation requirements of clause 5 of the code, another option to be considered will be Option D with the omission of clause 5 of the code. This option will be known as **Option E**.

For the purposes of further comparison, it is often the practice in some RISs to consider an alternative used in another jurisdiction. One such alternative is that used in South Australia, which prescribes certain buffer zones in addition to clearance spaces. These

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[52] Refer to Part 1.3 of this RIS.

[53] Transmission and distribution companies.

[54] See Part 4.3.4 of the RIS

[55] The reasons for the proposed increases in penalties are given in Part 5.2 of the RIS.

[56] Transmission and distribution companies.

buffer zones, in effect place a maximum limit on the amount of cutting or removal of vegetation, in addition to the minimum limits prescribed by the clearance spaces. The addition of buffer zones would entail more frequent cutting and would protect all trees, not just native trees and trees of environmental or cultural significance. This alternative will be considered in this RIS as **Option F.** Option F would be identical to Option D – except that the *proposed code* would involve an additional clause for buffer zones (see Table 4 in Part 4.3 of this RIS).

The proposed regulations and feasible alternatives (collectively termed 'options') to be considered for cost benefit assessment are therefore:

Option A: confine regulations to prescribing the Code only (the minimum regulation option);

Option B: remake the existing regulations and existing code;

Option C: the proposed regulations with the existing code;

Option D: the proposed regulations with the proposed new code (as settled by Parliamentary Counsel);

Option E: the proposed regulations with the proposed new code but without *clause 5* relating to notification;

Option F: a variation of the proposed regulations and code incorporating a different approach used in another jurisdiction, namely the addition of buffer zones as used in South Australia.

4.0 ASSESSMENT OF COSTS AND BENEFITS

4.1 Introduction

This section identifies the relative costs and benefits for the proposed regulations and each of the other viable options, as identified in Part 3.0 of this RIS, in comparison with the 'base case', as defined in Part 4.2 of this RIS. The 'base case' is used as the benchmark for measuring the incremental costs and benefits of each of the options, including the proposed regulations. Each of the options is assessed in relation to how well the underlying policy objectives identified in Part 2.2 of this RIS are likely to be achieved which is:

> *To reduce to as low as reasonably practicable the risks of:*
>
> - *fire, electrocution and power loss; and*
> - *consequential deaths, injuries and economic loss;*
>
> *as a result of vegetation coming into contact with electric lines.*

Discounted[57] quantitative estimates of costs and benefits are provided, over the 5-year life of the proposed regulations. The identification of costs and benefits of the various Options (A, B, C, D, E and F) is undertaken with respect to the following broad categories:

- benefits of public safety and economic activity;
- benefits of conservation of native or significant flora and fauna; and
- costs of compliance/adherence and administration.

Benefits to public safety and economic activity

This aspect of benefit relates to the minimisation of risks of fire, electrocution and power loss due to the interaction of vegetation and power lines and consequent death, injury and economic loss (see Part 2.1 of RIS).

Power loss relates to both outages and interruptions of electricity supply. Interruptions typically relate to electricity distribution and are classified as either momentary (i.e. between 10 and 50 seconds) or sustained interruptions (i.e. between approximately 50 minutes and 100 minutes on average[58]). Outages relating to electricity transmission range between an average of 10hrs where the outage is forced and 37hrs where the outage is due to a fault[59].

The term 'economic loss' in this RIS encapsulates loss of property (residential, agricultural, and commercial), vehicles, equipment, inventory, data, buildings, machinery, livelihood, as well as loss of community services, including loss of use and enjoyment of property. Relevant community services include:

- emergency services (e.g. fire, police and ambulance services);
- health care services;
- transport (air/public/roads);

[57] A real discount factor of 3.5% is used for present value calculations in this RIS.
[58] See Table A2.3 of Appendix 2.
[59] See Table A2.7 of Appendix 2.

- communication;
- water and sewerage; and
- waste disposal.[60]

The Value of Unserved Energy (VUE) is used to estimate the economic loss of interruptions or outages to electricity supply (see Part 2.1 of Appendix 2 for a more detailed discussion of this measure). Economic loss due to fires is estimated using direct measures of commercial and fire suppression/recovery costs, as well as, indirect measures of cost using paid insurance claims[61] (see Part 2.5 of Appendix 2).

Conservation of native or significant flora and fauna

This aspect of benefits relates to preventing over-clearing of vegetation of ecological, historical, aesthetic[62], cultural or environmental[63] significance. Ecological conservation benefits apply to not only flora but also, in the case of habitat trees, fauna which may be vulnerable, endangered or critically endangered[64].

Compliance and administration

This aspect of costs relates to the costs of electricity transmission and distribution businesses, councils, road authorities, and other 'responsible persons' in complying with the regulations[65] or cost of adherence[66] in the case of Option A (voluntary code). Costs of administration by ESV are also taken into consideration under this criterion as they relation to the activities of auditing and audit queries.

In relation to notification and consultation costs under Options B and C, there was a substantial difference between SPI Electricity Pty Ltd's and PowerCor's figures, which were $450,000 and $4,500,000 per annum, respectively. ESV decided to adopt the SPI Electricity Pty Ltd number as the baseline for estimating notification costs across the other distribution companies. That is to say, the SPI Electricity Pty Ltd figure of $450,000 was estimated *pro rata* across the other electricity distribution companies by using estimates for the number of overhead service lines (see Table A3.15) (column (p)); the proportion of overhead lines surrounded by vegetation (column (q)) – in the following formula:

$$\text{Cost of notification to a distribution company} =$$

[60] CRA International (2008)
[61] Insurance claims relating to Black Saturday Fires in 2009 remain unpaid.
[62] Vegetation with landscape, visual and amenity impacts
[63] Vegetation registered under the Heritage Act 1995 or Aboriginal Heritage Act 2006, or flora or habitat of fauna listed as threatened (Sec 10. Flora and Fauna Guarantee Act 1988) or in the DSE Threatened Species Advisory Lists. (See Proposed Electricity Safety (Electric Line Clearance) Regulations 2010)
[64] See 'Definitions' in the Proposed Electricity Safety (Electric Line Clearance) Regulations 2010
[65] As penalties are a cost of non-compliance rather than a cost of compliance with the regulations, penalties are not considered as part of the cost/benefit assessment.
[66] It would be misleading to use the term 'compliance' in relation to a voluntary code.

$$\$450{,}000 \times \frac{\text{(p) relevant distribution company} \times \text{(q) relevant distribution company}}{\text{(p) SPI Electricity Pty Ltd} \times \text{(q) SPI Electricity Pty Ltd}}$$

Where:

$450,000 = the cost of notification and consultation for SPI Electricity Pty Ltd

(p) relevant distribution company = the number of overhead service lines for the relevant distribution company;

(q) relevant distribution company = the proportion of overhead lines surrounded by vegetation for the relevant distribution company;

(p) SPI Electricity Pty Ltd = the number of overhead service lines for SPI Electricity Pty Ltd; and

(q) SPI Electricity Pty Ltd = the proportion of overhead lines surrounded by vegetation for SPI Electricity Pty Ltd

Importantly, the $4,500,000 cost of notification and consultation (under the exisiting code) provided by Powercor, should be taken within the context of a 'base case' operating vegetation clearing cost of *$96.92m* [67] per annum – as claimed by the distribution companies in the 2006 pricing review[68]. This includes an additional $1.6m for CitiPower and $47.5m for Powercor to maintain clearance spaces at all times. This also includes $29.3m for SPI Electricity Pty Ltd representing an additional cutting cycle. This is quite a variation from an annual operating vegetation clearing cost of *$6.54m*[69] *permittted* by the Essential Services Commission in their final decsion in the 2006 pricing review[70]. The considerable difference in the variation of the permitted and claimed values is mainly reflected by the claim made by large distribution companies of the maintenance of electric line clearance spaces at all times and additional cutting cycles.

Other large additional vegetation clearance costs considered in this RIS which are claimed by distribution companies relate to the omission of existing clauses 9.1. and 9.2 which relate to small branches (under 10mm) and small leaves and clause 11.2 (overhanging vegetation). Again it is anticipated that the large costs claimed by electricity distribution companies should be taken within the context of an annual operating vegetation clearing cost of *$96.92m*[71] claimed by the distribution companies in the 2006 pricing review.

Both **net benefit and cost-benefit ratios** are considered in the determination of the preferred option.

[67] The cost of electric line clearance is given as $84.5m per annum (2004 dollars) which represents the claim made by the distribution companies in the 2006 pricing review. Adjustment is based on a September 2004 Melbourne CPI index of 144.2 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No. 6401.0).
[68] See Essential Services Commission (October 2006)).
[69] See Part 3.7 for source of estimate (this is the 2009 dollar equivalent)
[70] See Essential Services Commission (October 2006)).
[71] $84.5m figure expressed in 2009 dollars (See Essential Services Commission (October 2006)).

The incremental benefits contained within this RIS are illustrative only. They are based on assumptions developed by ESV and illustrate that a small percentage reduction in the incidence of unplanned interruptions to power supply would generate significant cost savings (benefits).

4.2 The base case

The term 'base case' means the situation that would continue to exist in the absence of the proposed regulations. The base case thus includes the continuation of the existing requirements of the Act, especially Part 8 of the Act.

For sunsetting regulations, the 'base case' is normally defined as having no replacement regulations.[72] According to the Victorian Guide to Regulation, the reason for undertaking cost-benefit analysis against an unregulated situation is 'to ensure that the policy development process considers the full impact on society, in terms of costs and benefits, of the regulatory proposal and other viable options'[73].

However, because of s.89(2) of the Act, there must always be regulations in place prescribing the Code of Practice ('the Code'). On the other hand, it would be conceivably possible to make regulations that comply with the Act, but which impose no costs and confer no benefits. For these reasons, the base case for this RIS will be assumed to be regulations that impose no costs and confer no benefit beyond those imposed and confered by the Act.

An important component of the base case for this RIS is section 84 of the Act which requires responsible persons (as defined) to keep the whole or any part of a tree clear of electric lines. 'Keeping clear of electric lines' is interpreted as maintaining an adequate distance under various conditions of wind for all types of electric lines, with such a requirement translated into distance measurements in the Code.

The Code would also be part of the base case, but would be basic - containing only a translation of the clearance requirement of s.84 of the Act into distance measurements. Compliance with the Code would be voluntary because there would be no penalties for non-compliance. Under the base case, regulations would only prescribe a basic Code and there would be no incremental costs and benefits over and above those imposed by the Act. Other Victorian legislation e.g. native vegetation framework (refer to Part 2.1 of this RIS) is also part of the base case. So is existing common law e.g. duty of care (refer to Part 2.2 of this RIS).

4.3 Assessment of options

The assessment of the costs and benefits of the proposed regulations and the policy alternatives is conducted by discussing each option in terms of its expected incidence and distribution of ***incremental costs and benefits, relative to the 'base case'*** (defined in Part 4.2 of the RIS) and hereafter referred to as simply 'costs' and 'benefits'. A summarised description of the similarities and differences of the options to be assessed and the base case is shown in Table 5.

[72] Victorian Guide to Regulation, 2007.
[73] Victorian Guide to Regulation, 2007 (page 4-22).

Table 5: Summary description of similarities/differences of options and base case

Legislative instrument	Base Case	Option A	Option B	Option C	Option D	Option E	Option F
Code of Practice	*Basic Code* with translation of Act requirements into clearance spaces distances	*Proposed Code*	*Existing Code*	*Existing Code*	*Proposed Code*	*Proposed Code (without clause 5 relating to notification)*	*Proposed Code with additional buffer zone requirements*
Regulations	Minimal regulations prescribing clearance space distances (i.e. *basic Code*)	Minimal regulations prescribing the proposed Code only[74]	*Existing regulations* prescribing penalties, management plan requirements and exemptions and the *existing Code*	Regulations prescribing the *proposed* penalties, management plan requirements and exemptions and the *existing Code*	*Proposed regulations* prescribing penalties, management plan requirements and exemptions and the *proposed Code*	*Proposed regulations* prescribing penalties, management plan requirements and exemptions and the *proposed Code*	*Proposed regulations* prescribing penalties, management plan requirements and exemptions and the *proposed Code with additional buffer zone requirements*

4.3.1 Option A: proposed code with regulations prescribing the proposed Code only

Regulations under Option A would only prescribe the clauses of the *proposed Code*[75] and would not prescribe penalties, management plans, and ESV discretion to grant exemptions (see Table 5). Adherence to the Code would therefore be voluntary under this Option.

A voluntary Code would provide benefits to public safety and economic activity over and above the base case, although less than if compliance with the Code was mandatory. This is because some responsible persons would be likely to adhere to a prescribed code, even if there were no penalties for non-compliance. The rate of adherence for the purpose of cost benefit analysis, an on advice from ESV, is assumed to be 90% for major electricity transmission and distribution companies and 20% for other responsbile persons under sec.84 of the Act (see Table 1 of this RIS for a full description and breakup of responsbile persons).[76] The 90% rate of adherence by major electric companies would be driven by their preference to demonstrate concern in relation to issues of public safety and economic activity not only to the government, insurance companies, shareholders

[74] No regulations prescribing penalties, management plans or exemptions.
[75] Excluding *Clause 6(a)* which is irrelevant as there are no regulations prescribing management plans under this option. All other exemptions under *Clause 6* would also be redundant as *Clause 5* (notification and consultation is not compulsory under Option A)
[76] As determined by ESV

but, also, their customers. This preference is seen to be the consequence of the development of evermore sophisticated preferences by consumers in relation to quality, sustainability and public safety.

Moreover, the preparation and update of management plans, on a voluntary basis as part of one's 'own' risk strategy, would to a degree move electric companies towards an increased level of adherence to clearance spaces. However, a situation in which Option A could generate even higher amounts of benefit is not considered given that the most important element of risk management would be missing under this Option. That is to say, if the preparation of management plans was not prescribed, there is no guarantee that they would be prepared, and plans prepared by major electric companies would not need approval (or be checked) and audits of management plans would not be undertaken.

Benefits (cost savings) to public safety

Option A would to some extent reduce the risk of bushfires and electrocutions caused by the interaction of vegetation with electric lines. The value of lives saved (i.e. deaths avoided) under Option A is estimated using the value of statistical life as a proxy.[77] Importantly, this estimation does not capture the 'full' value of a human life, that is, the value to not only the individuals themselves but the value of that life to relatives and friends.

In relation to bushfires, safety benefits are calculated where there is a reduction in the proportion[78] of hectares burnt and associated number of lives lost/injuries[79] sustained due to the interaction of vegetation with electric lines by 0.25% as compared to the 'base case'.[80] In terms of electrocution deaths the proportion of lives lost is reduced by 0.25% as compared to the 'base case'. The value of benefits in terms of bushfire and electrocution related deaths avoided and bushfire related injuries avoided is summarised in Table 6. The total annual benefit in terms of public safety is given as only **$78,604**. This would be equal to ***$0.35m*** over 5 years in 2009 dollars.

Table 6: Annual and 5-year benefits of Option A in terms of public safety[81] - as compared to the base case

Benefit	Annual benefit	5-year benefit (2009 dollars)
Reduction in bushfire related death	$70,952	$320,350
Reduction in electrocution related death	$5,143	$23,219
Reduction in bushfire related injuries	$2,510	$11,333
Total	**$78,604**	***$354,902***

Benefits (cost savings) to economic activity

[77] See discussion in Part 2.5.3 of Appendix 2 for a more detailed discussion
[78] Proportion is reduced from 8% to 7.75% under Option A
[79] The roughly 200 injuries per annum sustained due to electric shock from failed neutrals are minimal and do not require hospitalisation and therefore, benefits would be negligible.
[80] Refer to Part 2.5.7 of Appendix 2.
[81] See Parts 2.5.7 and 2.5.11 of Appendix 2 for source of estimates.

With even a voluntary adherence to the proposed code, Option A would be help to mitigate to some extent the risks to economic activity arising from bushfires, and interruptions and outages to electricity. The costs to economic activity are summarised in Part 4.1 of this RIS. The annual and 5-year benefits to economic activity under Option A are estimated by assuming 0.25% less proportions of interruptions or outages arising from the interaction of vegetation – as compared to the base case. With respect to bushfire costs avoided (not including injuries and deaths) the benefit is calculated assuming 0.25% less proportion of hectares burnt due to the interaction of vegetation with electric lines as compared to the base case.

The value of benefits in relation to reduced economic loss from interruptions, outages and bushfires is summarised in Table 7. The total annual benefit in terms of economic activity under Option A is given as **$42.32m**. This would be equal to ***$191.07m*** over 5 years in 2009 dollars.

Table 7: Annual and 5-year benefits of Option A in terms of economic activity[82] - as compared to the base case

Benefit	Annual benefit	5-year benefit (2009 dollars)
Reduced general economic loss including loss of community services from loss of power from *distribution lines*	$10,263,072	$46,338,309
Reduced general economic loss including loss of community services from loss of power from *transmission lines*	$31,902,395	$144,040,985
Reduced paid insurance claims[83]/fire suppression & recovery costs/commercial costs from *fires*	$151,936	$685,999
Total	**$42,317,403**	***$191,065,293***

Benefit in terms of conservation of native or significant flora and fauna

In terms of providing benefits to conservation, Option A would *recommend*:

- minimum possible cutting or removal of native or significant vegetation;
- notification and consultation prior to the cutting and removal of significant vegetation including information on impact and actions to minimise impact;
- trees not be removed or vegetation cut for a distance exceeding 1 metre where an urgent cutting was required during the fire danger period[84]; and
- where practical, cutting and removing habitat trees should be done outside of breeding seasons or fauna should be translocated.[85].

[82] See Parts 2.2.3, 2.4.2 and 2.5.3 of Appendix 2 for source of estimates relating to interruptions, outages and bushfires, respectively.
[83] May include life insurance however this is not an appropriate measure of the 'value of life' but rather the value of economic inconvenience or disruption to recipients of the claim payments due to a death or injury.
[84] Declared under the **Country Fire Authority Act 1958**
[85] Designed to protect vulnerable, endangered or critically endangered species under the **Flora and Fauna Guarantee Act 1988**

This would help to minimise unnecessary risks to significant flora and fauna by providing 'safeguards', promoting a more cautious approach to cutting and removal, and encouraging strategies to minimise impact.

The incremental benefit of Option A in regards to conservation is estimated by assuming an adherence rate of 90% for majore electric companies and 20% for other responsible persons under sec.84 of the Act. Additonal benefits in terms of conservation are assumed to be 1% higher than under the 'base case'. Option A would provide an annual incremental benefit of **$0.12m** or ***$0.55m***[86] over 5 years in 2009 dollars as compared to the 'base case'. Table 8 provides a summary of incremental benefits in terms of public safety, economic activity and conservation. As shown in Table 8, Option A would provide an annual incremental benefit of **$42.52m**. Over 5 years this would be equal to ***$191.97m***.

Table 8: Summary of incremental annual and 5-year benefits of Option A in terms of public safety, economic activity and conservation - as compared to the base case

Benefit	Annual benefit	5-year benefit (2009 dollars)
Public safety	$78,604	$354,902
Economic activity	$42,317,403	$191,065,293
Conservation	$122,626	$553,663
Total	**$42,518,634**	***$191,973,858***

Cost of adherence

The absence of regulations prescribing penalties would mean that any adherence with the proposed Code would be strictly voluntary. The voluntary nature of this option implies zero 'compliance costs' for responsible persons. Furthermore, the absence of regulations prescribing penalties, management plans and subsequent need for auditing would eliminate administrative costs for ESV. However, given that 90% and 20% 'adherence' is expected by ESV for major electric companies, and other responsbile persons under sec.84 of the Act – the cost of such adherence is estimated. Without adherence to the 'recommendations' of the *proposed code*, the aforementioned benefits would not be realised and, inevitabley, such adherence has its associated costs.

Under Option A only the *proposed code* would be 'recommended'. However ESV anticipates that responsible persons will nonetheless prepare and update managment plans (based on the rate of adherence) as part of their own risk mangement strategy. Therefore the relevant[87] cost of developing and updating of management plans is also estimated under Option A. As shown in Table 9, the total annual cost of adherence is given as **$9.01m**. Over 5-years and in 2009 dollars, this would be equal to ***$40.73m***.

[86] See Part 2.6.3 of Appendix 2 for source of estimates.
[87] Where less than 100% adherence is expected

Table 9: Incremental annual and 5-year costs of Option A in terms of adherence[88] - as compared to the base case

Adherence cost category	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$3,937	$17,774
Updating management plans by transmission businesses	$36,000	$162,542
Updating management plans by distribution businesses	$59,400	$268,194
Updating management plans by other responsible persons under sec.84 of the Act[89]	$27,655	$134,138
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$4,197	$18,952
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$41,041	$185,304
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [90]	$263,971	$1,208,110
New development of dispute resolution procedures (*proposed clause 9*)	$475	$2,146
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$3,908,031	$17,644,965
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$664,048	$2,998,211
Omission of *exisiting clause 11.2* and the cost for electricitiydistribution businesses	$3,969,000	$17,920,243
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$54	$246
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$21,316	$96,244
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$15,598	$70,424
Total cost	**$9,014,724**	***$40,727,494***

Table 10 shows the total annual and 5-year incremental costs and benefits and net benefits and provides a 5-year cost-benefit ratio.

Table 10: Incremental annual and 5-year 'adherence' costs and benefits of Option A - as compared to the base case and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Adherence cost	$9,014,724	$40,727,494
Benefit	$42,518,634	$191,973,858
Net benefit	$33,503,909	***$151,246,364***

[88] See Parts 3.1.3 (management plans), 3.2.2 (notification (clause 5)), 3.3.2 (dispute resolution procedures), 3.5.3 (omission of existing clause 9.2.1 and 9.2.2), 3.6.2 (omission of existing clause 11.2), 3.8.2 (additional duties), 3.9.2 (management procedures), and 3.12 (notification where urgent cutting and removal is required) of Appendix 3 for source of estimates.
[89] Annual cost for 2010/11 reported.
[90] Annual cost for 2010/11 reported.

5-year cost-benefit ratio	0.212

Option A would generate $0.212 of cost for every $1 of benefit over 5 years. The incremental net benefit of Option A over 5 years in 2009 dollars would be ***$151.25m***.

4.3.2 Option B: existing code with existing regulations

Option B involves remaking the *existing regulations* including penalties (*existing reg.8*), management plan requirements (*existing reg.9*), and ESV power to grant exemptions (*existing reg.10*) and regulations which prescribe the *existing Code* (*existing reg.7*) (see Table 5). The differences between the existing and proposed regulations are listed in Appendix 1 and summarised in Part 5.2 of this RIS.

ESV anticipates 100% compliance for all 'compulsory' regulatory options, including Option B due to the following conditions:

- greater awareness of the potential risks of fires after 'Black Saturday';
- penalties for non-compliance;
- requirement for management plans to be made and updated annually (requiring 'relevant' responsible persons[91] to demonstrate how they will comply with the regulations and existing Code)
- requirement for management plans to be provided to ESV in the case of major electric businesses; and
- auditing of management plans.

Under Option B, management plan requirements and associated procedures (e.g. audits) are a key substantive part of the existing regulations.[92] Such requirements are essential to minimising risks of fire, electrocution and power loss due to the interaction of vegetation with electric lines.

Benefits (cost savings) to public safety

A 1% lower proportion of hectares burnt and associated deaths, and injuries is assumed for Option B, as compared to the 'base case'[93]. The full potential reduction in this proportion as compared to the base case, is mitigated by the loss of benefits under Option B by maintaining clauses 9.2.1 and 9.2.2 (which allows small branches under 10mm to remain in contact with electric lines) and clause 11.2 (which allows overhanging vegetation). This would continue to entail some risks to public safety. As shown in Table 11, the total annual incremental benefit in terms of public safety is given as **$0.38m**. This would be equal to ***$1.7m*** over 5 years in 2009 dollars.

[91] All responsible persons *other than* owners and occupiers of private land
[92] Jaguar Consulting (2005)
[93] See Parts 2.5.5 and 2.5.9 of Appendix 2 for a more detailed discussion

Table 11: Annual and 5-year benefits of Option B in terms of public safety[94] - as compared to the base case

Benefit category	Annual benefit	5-year benefit (2009 dollars)
Reduced bushfire related death	$328,100	$1,481,389
Reduced electrocution related death	$37,400	$168,863
Reduced bushfire related injuries	$11,607	$52,407
Total	**$377,107**	***$1,702,659***

Benefits (cost savings) to economic activity

With 100% expected compliance with the existing regulations and code of practice, Option B would be help to mitigate the risks to economic activity arising from bushfires, and interruptions and outages to electricity to a greater extent than Option A. The annual and 5-year incremental benefits to economic activity under Option B are estimated by assuming a reduction in the proportion of interruptions or hectares destroyed in bushfires due to vegetation by 1% – as compared to the base case. In terms of outages, the annual and 5-year benefits to economic activity under Option B are estimated assuming a 0.5% reduction in the proportion of *outages* from vegetation – as compared to the 'base case'.

The value of incremental benefits in relation to reduced economic loss from interruptions outages and bushfires is summarised in Table 12. The total annual incremental benefit in terms of economic activity is given as **$189.92m**. This would be equal to ***$0.88b*** over 5 years in 2009 dollars.

Table 12: Incremental annual and 5-year benefits of Option B in terms of economic activity[95] - as compared to the base case

Benefit category	Annual benefit	5-year benefit (2009 dollars)
Reduced general economic loss including loss of community services from loss of power from *distribution lines*	$47,459,293	$214,281,196
Reduced general economic loss including loss of community services from loss of power from *transmission lines*	$141,788,423	$640,182,157
Reduced paid insurance claims[96]/fire suppression & recovery costs/commercial costs from *fires*	$667,850.58	3015380.349
Total	**$189,915,567**	***$857,478,733***

[94] See Parts 2.5.5 and 2.5.9 of Appendix 2 for source of estimates.
[95] See Parts 2.1.1, 2.4.1 and 2.5.1 of Appendix 2 for source of estimates relating to interruptions, outages and bushfires, respectively for Option B
[96] May include life insurance however this is not an appropriate measure of the 'value of life' but rather the value of economic inconvenience or disruption to recipients of the claim payments due to a death or injury.

Benefit in terms of conservation of native or significant flora and fauna

Compliance with regulations prescribing clauses which relate to significant flora and fauna in the *existing Code* would be *mandatory*. Under a regime of 100% expected compliance, Option B would help to minimise unnecessary risks to significant flora and fauna by providing 'safeguards', promoting a more cautious approach to cutting and removal, and encouraging strategies to minimise impact.

Option B would require responsible persons to identify native and significant flora and fauna (including the habitat of endangered species) which may need to be cut or removed to comply with the *existing Code* as part of the management plan. In addition, auditing would be undertaken to determine compliance with this and all other requirements of the management plan.

However Option B would generate a smaller than otherwise incremental benefit due to the absence of *proposed clause 2(3)* which protects native trees from excessive cutting without imposing additional costs and effectively operates as a soft' buffer zone[97].

The benefit of Option B in regards to conservation is estimated by assuming 5% more conservation of flora and fauna value is provided by Option B, as compared to the base case. This would provide an annual incremental benefit of **$0.74m** or ***$3.33m*** over 5 years in 2009 dollars[98].

Table 13 provides a summary of benefits in terms of public safety, economic activity and conservation. As shown in Table 13, Option B would provide an annual incremental benefit of **$191.03m**. Over 5 years this would be equal ***$862.51m***.

Table 13: Summary of incremental annual and 5-year benefits of Option B in terms of public safety, economic activity and conservation - as compared to the base case

Benefit category	Annual benefit	5-year benefit (2009 dollars)
Public safety	$377,107	$1,702,659
Economic activity	$189,915,567	$857,478,733
Conservation	$737,174	$3,328,380
Total	**$191,029,849**	***$862,509,772***

Costs of compliance and administration

The incremental costs[99] of Option B would include the compliance costs for responsible persons as defined by Act[100] and administrative auditing/audit query costs for ESV. As shown in Table 14, the total annual cost of compliance and administration, is given as **$7.91m**. Over 5-years and in 2009 dollars, this would be equal ***$36.06m***.

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[97] For a more detailed discussion please see Part 2.6 of Appendix 2 in this RIS.
[98] See Part 2.6.2 of Appendix 2 for source of estimates.
[99] All costs and benefits are considered as incremental to the 'base case'.
[100] Public land managers, owners and operators of electric lines, VicRoads – otherwise the distribution company, except for Commonwealth lines

Table 14: Incremental annual and 5-year costs of Option B in terms of compliance and administration for ESV[101] - as compared to the base case

Compliance and administrative cost	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$21,652	$97,759
Updating management plans by transmission businesses	$44,000	$198,662
Updating management plans by distribution businesses	$72,600	$327,793
Updating management plans by other responsible persons under sec.84 of the Act[102]	$152,102	$737,760
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$64,565	$291,515
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$6,407,076	$28,928,285
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [103]	$924,509	$4,484,261
New development of dispute resolution procedures (*proposed clause 9*)	$2,377	$10,732
Auditing costs for ESV	$176,742	$798,000
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$99	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$23,685	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$17,331	$78,249
Total cost	**$7,906,738**	***$36,060,401***

Table 15 shows the total annual and 5-year incremental costs and benefits and net benefit and provides a 5-year cost-benefit ratio.

Table 15: Incremental annual and 5-year cost and benefit of Option B - as compared to the base case and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Cost	$7,906,738	$36,060,401
Benefit	$191,029,849	$862,509,772
Net benefit	**$183,123,110**	***$826,449,370***
5-year cost-benefit ratio		**0.0418**

Option B would result in $0.0418 of cost for every $1 of benefit over 5 years. The net incremental benefit of Option B over 5 years would equal ***$826.45m***.

4.3.3 Option C: existing code with proposed regulations

Option C involves new *proposed regulations* including penalties (*proposed reg.8*), management plan requirements (*proposed reg.9*), and power for ESV to grant exemptions

[101] See Parts 3.1.2 (management plans), 3.2.1 (notification (clause 5)), 3.3.1 (dispute resolution procedures), 3.4 (auditing costs for ESV), 3.8.1 (additional duties), 3.9.1 (management procedures), and 3.10 (notification after urgent cutting or removal), of Appendix 3 for source of estimates.
[102] Annual cost for 2010/11 reported.
[103] Annual cost for 2010/11 reported.

(*proposed reg.10*) and regulations which prescribe the *existing Code* (*existing reg.7*) (see Table 5). ESV expects 100% compliance for regulations under Option C for the same reasons as discussed under Option B.

Only major electric companies would need to submit their management plans to ESV for approval, under Option C. Consistent with modern safety risk management, this is part of a change of emphasis from approval to auditing of safety management plans. The primary responsibility for the preparation of adequate plans would rest with the operator rather than the regulator. Major electric companies would be an exception, because of the potential severe and widespread consequences of non-compliance on public safety and economic activity to Victorian communities. Power outages/interruptions and bush fires caused by the interference of vegetation with electric lines has been shown to result in considerable monetary and public safety consequences[104]. The larger the distribution network affected, the larger the potential consequences. Because of these potential severe and widespread consequences of non-compliance by major electric companies, ESV approval of management plans is essential to provide absolute certainty of compliance.

Benefits of public safety, economic activity and conservation

Option C would provide the same quantifiable benefits in terms of public safety, economic activity and conservation as under Option B as shown in Table 13 of this RIS and greater than Option A. Option C would provide an annual incremental benefit of **$191.03m**. Over 5 years this would be equal to ***$862.51m***.

Costs of compliance and administration

Due to the *less prescriptive nature* of the proposed management plan requirements, the cost of preparing and updating plans under Option C would be lower than under Option B. As shown in Table 16, the total annual cost of compliance and administration would be 'marginally' smaller under Option C, and is given as **$7.88m**. Over 5-years and in 2009 dollars, this would be equal to ***$35.94m***.

Table 16: Incremental annual and 5-year costs[105] of Option C in terms of compliance and administration for ESV[106] - as compared to the base case

Compliance and administrative cost	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$19,683	$88,872
Updating management plans by transmission businesses	$40,000	$180,602
Updating management plans by distribution businesses	$66,000	$297,993

[104] See Appendix 2 for detailed discussion and cost estimates of potential loss of power and safety issues associated with vegetation and electricity distribution and transmission businesses.
[105] All values are rounded for simplicity of presentation and are subject to rounding error.
[106] See Parts 3.1.1 (management plans), 3.2.1 (notification (clause 5)), 3.3.1 (dispute resolution procedures), 3.4 (auditing costs for ESV), 3.8.1 (additional duties), 3.9.1 (management procedures), and 3.10 (notification after urgent cutting or removal), of Appendix 3 for source of estimates.

Compliance and administrative cost	Annual cost	5-year cost (2009 dollars)
Updating management plans by other responsible persons under sec.84 of the Act[107]	$138,275	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$64,565	$291,515
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$6,407,076	$28,928,285
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [108]	$924,509	$4,484,261
New development of dispute resolution procedures (*proposed clause 9*)	$2,377	$10,732
Auditing costs for ESV	$176,742	$798,000
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$99	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$23,685	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$17,331	$78,249
Total cost	**$7,880,343**	***$35,936,585***

Table 17 shows the total annual and 5-year incremental cost and benefit and net benefit and provides a 5-year cost-benefit ratio.

Table 17: Incremental annual and 5-year costs and benefits[109] of Option C - as compared to the base case and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Cost	$7,880,343	$35,936,585
Benefit	$191,029,849	$862,509,772
Net benefit	**$183,149,506**	***$826,573,186***
5-year cost-benefit ratio		0.0417

Option C would result in $0.0417 of cost for every $1 of benefit over 5 years. The incremental net benefit of Option C would be slightly higher than with Option B and equal to ***$826.57m*** over 5 years in 2009 dollars.

4.3.4 Option D: proposed code with proposed regulations

Option D involves new *proposed regulations* including penalties (*proposed reg.8*); management plan requirements (*proposed reg.9*);ESV power to grant exemptions (*proposed reg.10*); and regulations which prescribe the *proposed Code* (*proposed reg.7*) (see Table 5). ESV anticipates 100% compliance for regulations under Option D for the same reasons as discussed under Option B (see Part 4.3.2 of this RIS).

Option D would provide greater benefits than under Options A, B and C and the introduction of the *proposed Code* would provide less hindrance to reducing the risk of contact of vegetation with electric lines. Compliance of 100% under Option D would

[107] Annual cost for 2010/11 reported.
[108] Annual cost for 2010/11 reported.
[109] All values are rounded for simplicity of presentation and are subject to rounding error.

generate higher incremental benefits than under Option A (which has only 90% adherence by major elecric companies and 20% adherence by other responsible persons under sec.84 of the Act). Unlike Option A, Option D would prescribe management plans, approvals of complex plans, and audits – key features to the risk reduction strategy of proposed regulations.

Furthermore, under Option D, there would be an omission to exisiting *clauses 9.2.1* and *9.2.2* relating to small leaves and branches less than 10mm in diameter. This would ensure that in the case of aerial bundled cables, vegetation is kept free at 'all times' and provide greater risk management. This is particularly in the case where aerial bundled cables are abraded over time increasing the risk of power loss, fires and electrocutions due to vegetation coming into contact. The omission of *clause 11.2* from the proposed code would mean that vegetation would no longer be allowed to overhang bare overhead power lines in hazardous bushfire risk areas (HBRAs)[110] under certain conditions. This would provide an additional avenue of risk reduction as compared with either Options B or C.

Benefits (cost savings) to public safety

Option D would reduce the risk of bushfires and electrocutions caused by the interaction of vegetation with electric lines. Benefits are calculated by assuming a 1.5% reduction in the proportion of hectares burnt and associated lives lost/injuries sustained [111] as compared to the 'base case'. The value of incremental benefits in terms of bushfire and electrocution related deaths avoided and bushfire related injuries avoided is summarised in Table 18. The total annual incremental benefit in terms of public safety is given as **$0.57m**. This would be equal to ***$2.55m*** over 5 years in 2009 dollars.

Table 18: Annual and 5-year benefits of Option D in terms of public safety[112] - as compared to the base case

Benefit	Annual benefit	5-year benefit (2009 dollars)
Reduction in bushfire related death	$492,150	$2,222,083
Reduction in electrocution related death	$56,100	$253,294
Reduction in bushfire related injuries	$17,411	$78,610
Total	**$565,661**	***$2,553,988***

Benefits (cost savings) to economic activity

With 100% expected compliance, Option D would be help to mitigate the risks to economic activity arising from bushfires, and interruptions and outages to electricity. The costs to economic activity are summarised in Part 4.1 of this RIS. The annual and 5-year benefits to economic activity under Option D are estimated assuming a 1.5% and 0.5% reduction in the proportion of *interruptions* and *outages* from vegetation, respectively – as compared to the 'base case'. With respect to bushfire costs avoided (not including

[110] As determined by the Country Fire Authority (CFA)
[111] The roughly 200 injuries per annum sustained due to electric shock from failed neutrals are minimal and do not require hospitalisation and therefore, benefits would be negligible.
[112] See Parts 2.5.6 and 2.5.10 of Appendix 2 for source of estimates.

injuries and deaths) the incremental benefit is calculated assuming a 1.5% reduction in the proportion of hectares destroyed due to vegetation interacting with electric lines – as compared to the 'base case'.

The value of incremental benefits in relation to reduced economic loss from interruptions, outages and bushfires is summarised in Table 19. The total annual benefit in terms of economic activity is given as **$213.98m**. This would be equal to ***$966.13m*** over 5 years in 2009 dollars.

Table 19: Incremental annual and 5-year benefits of Option D in terms of economic activity[113] - as compared to the 'base case'

Benefit category	Annual benefit	5-year benefit (2009 dollars)
Reduced general economic loss including loss of community services from loss of power from *distribution lines*	$71,188,940	$321,421,794
Reduced general economic loss including loss of community services from loss of power from *transmission lines*	$141,788,423	$640,182,157
Reduced paid insurance claims[114]/fire suppression & recovery costs/commercial costs from *fires*	$1,001,776	$4,523,071
Total	**$213,979,139**	***$966,127,021***

Benefit in terms of conservation of native or significant flora and fauna

Option D would 'require':

- minimum possible cutting or removal of native or significant vegetation;
- notification and consultation prior to the cutting and removal of significant vegetation including information on impact and actions to minimise impact;
- trees not be removed or vegetation cut for a distance exceeding 1 metre where an urgent cutting was required during the fire danger period[115]; and
- where practical, cutting and removing habitat trees should be done outside of breeding seasons or fauna should be translocated.[116].

This would help to minimise unnecessary risks to significant flora and fauna by providing 'safeguards', promoting a more cautious approach to cutting and removal, and encouraging strategies to minimise impact.

In particular, the introduction of *clause.2.3* under the *proposed Code* which recommends minimum possible cutting or removal of native or significant vegetation would provide additional benefit in relation to the conservation. This clause is more targeted to

[113] See Parts 2.2.2, 2.4.2 and 2.5.2 of Appendix 2 for source of estimates relating to interruptions, outages and bushfires, respectively.
[114] May include life insurance however this is not an appropriate measure of the 'value of life' but rather the value of economic inconvenience or disruption to recipients of the claim payments due to a death or injury.
[115] Declared under the **Country Fire Authority Act 1958**
[116] Designed to protect vulnerable, endangered or critically endangered species under the **Flora and Fauna Guarantee Act 1988**

vegetation requiring protection and would help to prevent excessive cutting or removal. For these reasons as well as 100% compliance, Option D would provide greater conservation benefits than Options A, B or C. The incremental benefit of Option D in regards to conservation is estimated assuming a 10% higher value than the 'base case'. Option D would provide an annual benefit of **$1.51m** or ***$6.82m***[117] over 5 years in 2009 dollars, as compared to the 'base case'.

Table 20 provides a summary of incremental benefits in terms of public safety, economic activity and conservation. As shown in Table 20, Option D would provide an annual benefit of **$156.43m**. Over 5 years this would be equal to ***$0.71b***.

Table 20: Summary of annual and 5-year incremental benefits of Option D in terms of public safety, economic activity and conservation - as compared to the base case

Benefit category	Annual benefit	5-year benefit (2009 dollars)
Public safety	$565,661	$2,553,988
Economic activity	$213,979,139	$966,127,021
Conservation	$1,511,207	$6,823,180
Total	**$216,056,007**	***$975,504,189***

Costs of compliance and administration

Due to the *less prescriptive nature* of the proposed management plan requirements, the cost of preparing and updating plans under Option D would be lower than under Option B and identical to Option C. Also, unlike Options B and C which require written notification under exisitng clause.3 and allows advertising as a last resort, proposed clause.5 under Option D provides an inexpensive alternative to notification allowing newspaper advertising at least 14 days before cutting and removal and not for more than 60 days. On the other hand, the omission of *clauses 9.2.1* and *9.2.2* and *11.2* would create *additional costs* under Option D, as compared with Options B and C.

The total annual incremental compliance and administrative cost of Option D is given as **$12.9m**. Over 5-years and in 2009 dollars, this would be equal to ***$58.31m***.

[117] See Part 2.6.2 of Appendix 2 for source of estimates and more detailed discussion

Table 21: Incremental annual and 5-year costs of Option D in terms of compliance[118] - as compared to the base case

Compliance cost	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$19,683	$88,872
Updating management plans by transmission businesses	$40,000	$180,602
Updating management plans by distribution businesses	$66,000	$297,993
Updating management plans by other responsible persons under sec.84 of the Act[119]	$138,275	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$4,664	$21,057
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$45,602	$205,894
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [120]	$293,301	$1,342,344
New development of dispute resolution procedures (*proposed clause 9*)	$2,377	$10,732
Auditing costs for ESV	$176,742	$798,000
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$4,342,257	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$3,320,240	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitydistribution businesses	$4,410,000	$19,911,381
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$99	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$23,685	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$17,331	$78,249
Total cost	**$12,900,255**	***$58,309,774***

Table 22 shows the total annual and 5-year incremental cost and benefit and net benefit and provides a 5-year cost-benefit ratio.

Table 22 Annual and 5-year cost and benefit of Option D - as compared to the base case and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Cost	$12,900,255	$58,309,774
Benefit	$216,056,007	$975,504,189
Net benefit	$203,155,752	***$917,194,415***
5-year cost-benefit ratio		**0.0598**

[118] See Parts 3.1.1 (management plans), 3.2.2 (notification (clause 5)), 3.3.1 (dispute resolution procedures), 3.4 (auditing costs for ESV), 3.5.2 (omission of existing clause 9.2.1 and 9.2.2), 3.6.1 (omission of existing clause 11.2), 3.8.1 (additional duties), 3.9.1 (management procedures), and 3.10 (notification where there is urgent cutting or removal) of Appendix 3 for source of estimates.
[119] Annual cost for 2010/11 reported.
[120] Annual cost for 2010/11 reported.

Option D would create $0.0598 of cost for every $1 of incremental benefit over 5 years. This cost-benefit ratio would be lower than Option A but geater than Options B or C. The incremental net benefit of Option D as compared to the 'base case' would be equal to ***$917.19b*** over 5 years in 2009 dollars.

4.3.5 Option E: proposed code (without clause 5 requiring notification) with proposed regulations

Option E would be identical to Option D except for the removal of *clause 5* from the proposed code relating to notification.

Benefits (cost savings) to public safety

The value of incremental benefits in terms of bushfire and electrocution related deaths avoided and bushfire related injuries avoided would be identical to Option D as summarised in Table 18 earlier in the RIS. The total annual benefit in terms of public safety is given as **$0.57m**. This would be equal to ***$2.55m*** over 5 years in 2009 dollars.

Benefits (cost savings) to economic activity

Under Option E, the value of incremental benefits in relation to reduced economic loss from interruptions, outages and bushfires would be identical to Option D as summarised in Table 19 earlier in this RIS. The total annual benefit in terms of economic activity is given as **$213.98m**. This would be equal to ***$966.13m*** over 5 years in 2009 dollars.

Benefit in terms of conservation of native or significant flora and fauna

As with Option D, the introduction of *clause.2.3* under the *proposed Code* recommending minimum possible cutting or removal of native or significant vegetation Under Option E would provide a more targeted benefit in relation to conservation. However, the removal of *clause 5* from the proposed code under Option E would result in lower incremental conservation benefits than under Option D. Apart from the case of urgent cutting and removal, the removal of notification and consultation requirement under clause.5 would lead to less conservation of vegetation of significance. Information held by affected persons regarding the significance of vegetation may go unnoticed by responsible persons resulting in excessive cutting or removal. Conservation benefits are therefore assumed to be 5.5%[121] higher than under the 'base case'. Option E would provide an annual incremental conservation benefit of **$0.81m** or ***3.68m***[122] over 5 years in 2009 dollars as compared to the 'base case'.

Table 23 provides a summary of incremental benefits in terms of public safety, economic activity and conservation. As shown in Table 23, Option E would provide an annual benefit of **$215.36m**. Over 5 years this would be equal ***$972.36m*** in 2009 dollars.

[121] This is the proportion obtained by increasing the value of conservation benefit under Option E by 0.5% more than the value of conservation under Options B and C (see Part 2.6.4 of Appendix 2 for a more detailed discussion).
[122] See Part 2.6.2 of Appendix 2 for source of estimates.

Table 23: Summary of incremental annual and 5-year benefits of Option E in terms of public safety, economic activity and conservation - as compared to the 'base case'

Benefit	Annual benefit	5-year benefit (2009 dollars)
Public safety	$565,661	$2,553,988
Economic activity	$213,979,139	$966,127,021
Conservation	$814,578	$3,677,860
Total	**$215,359,378**	***$972,358,869***

Costs of compliance and administration

Unlike Option D, under Option E there would be no notification and consultation costs. However Option E would create other *additional costs* as compared to Option D. A lack of notification and consultation[123], would hinder the ability of property occupiers to put in place contingencies for coping with potential disruptions to their private/commercial activities. This would lead to less prevention of conflicts between property occupiers and responsible persons entering properties without notice. At the very least, there would be diminution of existing rights to the use and enjoyment of private property.

If an additional 1% (above the base case) of private farms failed to realise the full use-value of their property the annual cost of loss in the use of private property to farmers would be $6,950[124] . This would equal *$31,380* over 5 years in 2009 dollars.

The total annual incremental cost of under Option E is given as **$12.56m**. Over 5-years and in 2009 dollars, this would be equal ***$56.77m***.

Table 24: Incremental annual and 5-year costs of Option E in terms of adherence[125] - as compared to the 'base case'

Adherence cost	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$19,683	$88,872
Updating management plans by transmission businesses	$40,000	$180,602
Updating management plans by distribution businesses	$66,000	$297,993
Updating management plans by other responsible persons under sec.84 of the Act[126]	$138,275	$670,691
Loss of private property use value due to removal of notification and consultation requirement (clause 5)	$6,950	$31,380
New development of dispute resolution procedures (*proposed clause 9*)	$2,377	$10,732
Auditing costs for ESV	$176,742	$798,000

[123] Apart from the case of urgent cutting and removal
[124] see Part 3.14 of Appendix 3 in this RIS for source of estimates
[125] Parts 3.1.1 (management plans), 3.13 (loss of private property use value), 3.3.1 (dispute resolution procedures), 3.4 (auditing costs for ESV), 3.5.2 (omission of existing clause 9.2.1 and 9.2.2), 3.6.1 (omission of existing clause 11.2), 3.8.1 (additional duties), 3.9.1 (management procedures), 3.10 (notification of urgent cutting or removal), and 3.12 (loss of private property use value) of Appendix 3 for source of estimates.
[126] Annual cost for 2010/11 reported.

Adherence cost	Annual cost	5-year cost (2009 dollars)
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$4,342,257	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$3,320,240	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitydistribution businesses	$4,410,000	$19,911,381
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$99	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$23,685	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$17,331	$78,249
Total cost	**$12,563,638**	***$56,771,858***

Table 25 shows the total annual and 5-year incremental cost and benefit of Option E, as well as the net benefit and provides a 5-year cost-benefit ratio.

Table 25: Incremental annual and 5-year cost and benefit of Option E - as compared to the 'base case' and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Cost	$12,563,638	$56,771,858
Benefit	$215,359,378	$972,358,869
Net benefit	$202,795,739	***$915,587,011***
5-year cost-benefit ratio		0.0584

Option E would create $0.0584 of cost for every $1 of benefit over 5 years. This would be less than Options A or D but greater than Options B or C. Option E would provide ***$915.59m*** of incremental net benefits over 5 years in 2009 dollars.

4.3.5 Option F: proposed code (with additional clause for buffer zones) with proposed regulations

Option F would be identical to Option D – except that the *proposed code* would involve an additional clause for buffer zones (see Table 5 in this RIS). ESV expects 100% compliance for regulations under Option F for the same reasons as discussed under Option B.

Benefits (cost savings) to public safety, economic activity and conservation

As with Option D – Option F would provide a total annual incremental benefit of **$216.06m** (see Table 20 in this RIS). Over 5 years this would be equal to ***$975.5m***.

A buffer zone would protect all trees, not just native trees and trees of environmental or cultural significance. This is appropriate in South Australia where there are relatively few trees on a state-wide basis, and the policy is about protecting trees in general. However, it is not as important to protect all trees in Victoria. The conservation policy for Victoria in terms of electric line clearance therefore relates to native trees and significant flora and fauna. Therefore, Option F would not be expected to confer any

additional conservation benefits as compared to Option D.

Costs of compliance and administration

A buffer zone would require responsible persons to engage in more frequent cutting and removal in order to comply with the regulations and Code. This would significantly increase the cost of clearance. The estimate for the additonal cost of a buffer zone under Option E assumes an operating cost of *$6.54m*[127] and represents the 2009 equivalent dollar value permittted by the Essential Services Commission in their final decision in the 2006 pricing review[128]. As discussed in Part 3.7 of Appendix 3 in the RIS the annual incremental cost of a 'buffer zone' under Option F would be $3.27m. Over 5 years in 2009 dollars, this would equal between ***$14.76m***.

As shown in Table 26, the total annual incremental cost of Option F is given as **$16.17m**. Over 5-years and in 2009 dollars, this would be equal to ***$73.07m***.

Table 26: Incremental annual and 5-year costs of Option F in terms of compliance[129] - as compared to the base case

Compliance cost	Annual cost	5-year cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$19,683	$88,872
Updating management plans by transmission businesses	$40,000	$180,602
Updating management plans by distribution businesses	$66,000	$297,993
Updating management plans by other responsible persons under sec.84 of the Act[130]	$138,275	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$4,664	$21,057
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$45,602	$205,894
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [131]	$293,301	$1,342,344
New development of dispute resolution procedures (*proposed clause 9*)	$2,377	$10,732
Auditing costs for ESV	$176,742	$798,000
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$4,342,257	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$3,320,240	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitydistribution businesses	$4,410,000	$19,911,381
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$99	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$23,685	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$17,331	$78,249

[127] See Part 3.10.1 for source of estimate
[128] See Essential Services Commission (October 2006)).
[129] See Parts 3.1.1 (management plans), 3.2.2 (notification (clause 5)), 3.3.1 (dispute resolution procedures), 3.4 (auditing costs for ESV), 3.5.2 (omission of existing clause 9.2.1 and 9.2.2), 3.6.1 (omission of existing clause 11.2), 3.8.1 (additional duties), 3.9.1 (management procedures), 3.11 (notification where there is urgent cutting and removal) and 3.7 (buffer zone) of Appendix 3 for source of estimates.
[130] Annual cost for 2010/11 reported.
[131] Annual cost for 2010/11 reported.

Compliance cost	Annual cost	5-year cost (2009 dollars)
Additional proposed clause for a 'Buffer Zone'	$3,269,001	$14,759,712
Total cost	**$16,169,256**	***$73,069,486***

Table 27 shows the total annual and 5-year incremental cost and benefit of Option F, as well as, the net benefit and provides a 5-year cost-benefit ratio.

Table 27: Annual and 5-year costs and benefits of Option F - as compared to the base case and cost-benefit ratio

	Annual cost/benefit	5-year Cost/benefit (2009 dollars)
Cost	$16,169,256	$73,069,486
Benefit	$216,056,007	$975,504,189
Net benefit	$199,886,751	***$902,434,702***
5-year cost-benefit ratio		0.0749

Option F would create $0.0749 of cost for every $1 of benefit over 5 years. The cost-benefit ratio would be lower than under Option A but greater than any of the other Options. The incremental net benefit of Option F over 5 years would be equal to ***$902.43m*** in 2009 dollars.

4.3.6 Summary of costs and benefits + cost-benefit ratios under Options A, B, C, D, E and F

Table 28 provides a summary of costs and benefits for each of the Options as compared to the 'base case' including 5-year net benefits.

Table 28: Summary of incremental 5 year costs and benefits (2009 dollars) – Options A, B, C, D, E and F

Option	Public safety benefit	Economic activity benefit	Conservation benefit	Total incremental benefit	Total incremental Compliance/ adherence and admin cost	Net incremental benefit
Option A	$354,902	$191,065,293	$553,663	$191,973,858	$40,727,494	$151,246,364
Option B	$1,702,659	$857,478,733	$3,328,380	$862,509,772	$36,060,401	*$826,449,370*
Option C	$1,702,659	$857,478,733	$3,328,380	$862,509,772	$35,936,585	*$826,573,186*
Option D	**$2,553,988**	**$966,127,021**	**$6,823,180**	**$975,504,189**	**$58,309,774**	***$917,194,415***
Option E	$2,553,988	$966,127,021	$3,677,860	$972,358,869	$56,771,858	*$915,587,011*
Option F	$2,553,988	$966,127,021	$6,823,180	$975,504,189	$73,069,486	*$902,434,702*

Table 29, provides a summary of cost-benefit ratios over 5 years for Options A, B, C, D, E and F

Table 29: Summary of 5-year cost-benefit ratios – Options A, B, C, D, E and F

Option	5-year cost-benefit ratio
Option A	0.2122
Option B	0.0418
Option C	0.0417
Option D	**0.0598**
Option E	0.0584
Option F	0.0749

4.3.7 Analysis of cost-benefit ratios and incremental net benefits under Options A, B, C, D, E and F

The lowest cost-benefit ratio of 0.0417 is provided by Option C (*existing code of practice + proposed regulations*) followed by the ratio of 0.0418 under Option B (*existing code of practice + existing regulations*). These ratios are both smaller than the ratio of 0.0598 under Option D (*proposed code of practice + proposed regulations*). The reason for this is that the higher total incremental benefit under Option D, as compared to Options B and C, as a proportion of total benefits – is smaller than the incremental costs, (i.e. the costs of omitting existing clauses 9.2.1 and 9.2.2 and 11.2), as a proportion of total costs (see Table 28).

Moreover the cost-benefit ratio of Option E (*proposed code of practice but <u>without notification and consultation</u> + proposed regulations*) is slightly smaller than option D. Again, the reduced conservation benefit of Option E[132], as compared to Option D, as a proportion of total benefits is smaller than the cost savings as a proportion of total costs in terms of notification and consultation costs avoided under Option E (see Table 28). For this reason the cost-benefit ratio under Option E is slightly smaller than for Option D (see Table 29). However, the net incremental benefit provided by Option D is larger than the net incremental benefit provided by any other Option (see Table 28).

4.4 Selection of preferred option

As shown in Table 28, Options D and F provide the largest combination of incremental benefits in terms of public safety and economic activity, as well as, conservation of flora and fauna of significance. However the incremental costs of a 'buffer zone' under Option F are considerably large. Option A provides the lowest incremental benefit over 5-years of ***$147.51m*** (see Table 28). Furthermore, the largest net incremental benefit over 5 years is provided by Option D. It also provides the highest level of incremental benefit over 5-years of ***$917.19m*** in 2009 dollars as compared to the next highest net benefit of ***$915.59m*** under Option E (see Table 28). The proposed regulations and the

[132] Following the removal of *proposed clause.5* (notification and consultation)

proposed code are therefore the preferred option. A summary of 5-year costs and benefits under Option D (the preferred option) is summarised in Table 30.

Table 30: A summary of 5-year net costs and benefits under Option D – as compared to the 'base case'

Benefit/Cost Item	5-year benefit/cost (2009 dollars)
PUBLIC SAFETY BENEFITS	
Reduction in bushfire related death	$2,222,083
Reduction in electrocution related death	$253,294
Reduction in bushfire related injuries	$78,610
Total public safety benefits	**$2,553,988**
ECONOMIC ACTIVITY BENEFITS	
Reduced general economic loss including loss of community services due to reduced loss of power from *distribution lines*	$321,421,794
Reduced general economic loss including loss of community services due to reduced loss of power from *transmission lines*	$640,182,157
Reduced paid insurance claims[133]/fire suppression & recovery costs/commercial costs	$4,523,071
Total economic activity benefit	**$966,127,021**
CONSERVATION BENEFIT	
Total conservation benefit	**$6,823,180**
Total incremental benefit	***$975,504,189***
Development of management plans by other responsible persons under sec.84 of the Act	$88,872
Updating management plans by transmission businesses	$180,602
Updating management plans by distribution businesses	$297,993
Updating management plans by other responsible persons under sec.84 of the Act[134]	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$21,057
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$205,894
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [135]	$1,342,344
New development of dispute resolution procedures (*proposed clause 9*)	$10,732
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitydistribution businesses	$19,911,381
Auditing costs for ESV	$798,000
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$78,249
Total incremental cost	***$58,309,774***

[133] May include life insurance however this is not an appropriate measure of the 'value of life' but rather the value of economic inconvenience or disruption to recipients of the claim payments due to a death or injury.
[134] Annual cost for 2010/11 reported.
[135] Annual cost for 2010/11 reported.

In summary, the proposed regulations and code (**Option D**) would have the optimum combination of costs and benefits for achieving the policy objective; and the benefits of the proposed regulations (namely public safety, improved economic activity, and conservation) outweigh the costs.

5.0 Nature and effects of preferred option

5.1. Explanation of proposed regulations

This Part of the RIS describes the nature and likely effects of the proposed regulations. Changes from the existing regulations are discussed in Part 5.2

The context in which these regulations exist is, as discussed in section 1.2, the experience of the 1997 and 1983 Victorian bushfires which highlighted:

- the need to ensure that electricity lines do not come into contact with vegetation, and
- the need for a Code of Practice (CoP) setting out the specific requirements for managing vegetation near electricity lines.

Division 3 of Part 8 of the Electricity Safety Act therefore mandates that:

- there must be a CoP;
- there must always be regulations that prescribe this CoP;
- there must be a consultative committee to provide advice on development and maintenance of the CoP; and
- responsible persons must comply with the CoP.

In general terms, the proposed regulations and the incorporated Code of Practice establish requirements intended to reduce the risk to the community from the effects of interaction between electric lines and trees.

The proposed regulations cover the following matters:

- objectives, definitions and other preliminary matters;
- prescribing the Code of Practice for the purposes of the Act;
- identifying the prescribed penalty provisions for the purposes of section 90 of the Act;
- setting out a range of requirements in relation to management plans, including that specified responsible persons must prepare a management plan, the content of management plans; and in the case of major electric company, the management plan must be submitted to ESV for approval.

5.1.1 Preliminary matters

Regulation 1 states that the objectives of the proposed regulations are to—

(a) prescribe the Code of Practice for Electric Line Clearance;

(b) prescribe—

(i) management procedures for standards and practices to be adopted and observed in tree cutting or removal in the vicinity of

electric lines and the keeping of the whole or any part of a tree clear of electric lines;

(ii) management procedures to minimise danger of electric lines causing fire or electrocution;

(iii) other matters for or with respect to the maintenance of electric lines;

(c) provide for management plans relating to compliance with the Code;

(d) provide for other matters authorised under the Act relating to electric line clearance

Regulation 2 cites the provisions of the Act that authorise the making of the proposed regulations (see Part 1.2 of this RIS).

Regulation 3 specifies the commencement date of the proposed regulations.

Regulation 4, revokes the existing line clearance regulations, together with the *Electricity Safety (Infringements) Regulations 2000*, which are to be replaced by proposed regulation 11.

Regulation 5 defines various specific terms used in the proposed regulations.[136] In particular, the definition of **'trees of cultural or environmental significance'** is relevant to proposed regulation 9(3)(g) and proposed clause 2(3) of the Code.

Regulation 6 prescribes voltages for the purposes of the definition of 'low voltage line' in section 3 of the Act.

Regulation 10 authorises ESV to exempt a responsible person from any of the requirements of the regulations subject to any conditions specified.

Regulation 11 prescribes the offences under the proposed regulations for which infringement notices may be served. (As a less costly alternative to court proceedings, infringement notices provide a benefit, rather than a cost, to the defendant, the prosecution and to witnesses).

Regulation 12 reiterates the requirement of the Act that the regulations expire after five years.

5.1.2 Code of practice

Regulation 7 prescribes the *Code of Practice for Electric Line Clearance*, for the purposes of Part 8 of the Act.

Regulation 8 prescribes the clauses of the Code for which there will be a penalty for non-compliance, for the purposes of section 90 of the Act. (Under section 90, the penalties are 50 penalty units[137] for a natural person, and 250 penalty units for a body corporate).

[136] It should also be noted that definitions specified in the Act also apply to regulations made under the Act.
[137] For the 2009/10 financial year, the value of one penalty unit has been set by the Treasurer at $116.82.

5.1.3 Management plans and procedures

Regulation 9, in relation to management plans and procedures is a key substantive part of the regulations. The preparation of an adequate management plan demonstrates the competence and commitment of the relevant responsible person to compliance with the code of practice. Section 151 of the Act provides that regulations may be made requiring management plans to be prepared and submitted to ESV for approval. Regulation 9 therefore establishes the requirements for management plans.

Subregulations 9(1) and (2) establish that the obligation to prepare a management plan applies to the various classes of responsible person *other than* owners and occupiers of private land. Under subregulation (4), the obligation to submit a management plan for ESV approval applies only to major electric companies. These are defined in the Act as transmission companies and distribution companies. Because of these potential severe and widespread consequences of non-compliance by major electric companies, ESV approval of their management plans is essential to provide absolute certainty of compliance. (ESV intends to audit other management plans from time to time rather than assess all of them for approval).

Subregulation 9(3) lists the information that responsible persons are required to include in their management plans. This assists responsible persons in the preparation of plans and assists ESV in assessing plans. In summary, the information required to be included in management plans is:

- contact details of the responsible person and key staff;
- the objectives of the management plan;
- the land to which the management plan applies by the inclusion of a map;
- the location of areas containing trees which may need to be cut or removed to ensure compliance with the Code and that are native, or of cultural or environmental significance
- the means which the responsible person is required to use to identify such trees;
- the management procedures that the responsible person is required to adopt to ensure compliance with the Code;
- a description of the measures that must be used to assess the performance of the responsible person under the management plan;
- details of the audit processes that must be used to determine the responsible person's compliance with the Code;
- the qualifications and experience that the responsible person must require of the persons who are to carry out the cutting or removal of trees.

Regulation 9(8) provides that it is an offence to fail to comply with a management plan approved by ESV. This reflects the centrality of management plans in the regulatory arrangements for ensuring high standards of fire safety in relation to trees potentially interfering with transmission and distribution lines..

5.1.4 Schedule: The Code of Practice for Electric Line Clearance

The following describes the major elements of the Code.

Part 1: Preliminary

Clause 1 sets out definitions of a number of terms used in the Code.

Part 2: Clearance space requirements for all electric lines

Clauses 2(1) and 2(2) of the Code require responsible persons to create and maintain the clearance spaces necessary to comply with the Act's requirement that trees be kept clear of electric lines. These clearance spaces vary for different types of electric line, different voltages and different bushfire risk areas.

Clause 2(3) requires a responsible person to restrict cutting or removal of native trees or trees of cultural or environmental significance to the minimum extent necessary to comply with the Code or to make an unsafe situation safe.

Clause 3 enables hazard trees[138] to be cut or removed if assessed by qualified arborist.

Clause 4 protects vulnerable, endangered or critically endangered faunal species under the **Flora and Fauna Guarantee Act 1988**. Cutting or removal of trees is to be undertaken outside of breeding season wherever practicable.

Clause 5 imposes various requirements on responsible persons to notify and consult with occupiers, owners and affected persons before undertaking pruning or clearing.

Clause 6 exempts certain responsible persons, i.e. those specified in section 84(4) to (7) of the Act, from having to comply with notice and consultation requirements if they are carrying out urgent pruning or urgent clearing that is required in a number of specified circumstances e.g. due to a fallen tree, or where an arborists assessment confirms imminent likelihood of contact between a tree and an electric line. This clause also sets out various matters that responsible persons must attend to in connection with urgent pruning/clearing carried out under clause 6, including notification of the relevant owner/occupier and affected persons and the keeping of appropriate records.

Clause 7 sets out the additional duties of local councils, the Roads Corporation and others. These require that if a responsible person referred to in section 84(4) or (6) of the Act becomes aware of safety concerns in relation to trees near power lines, they must consult with the relevant distribution company, railway or tramway company, as appropriate.

Clause 8(1) requires distribution companies to advise occupiers of land annually of the duties of the responsible person under the Code, of the dangers involved in pruning and clearing and about the precautions that should be taken to safely maintain the electric line.

Clause 8(2) requires distribution to advise responsible persons, upon request, how to identify locations where pruning/clearing will be required and where to obtain information on methods for maintaining clearance between electric lines and trees.

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[138] Defined as likely to fall onto or otherwise come into contact with an electric line.

Clause 9 requires responsible persons to establish procedures to be followed for the independent resolution of disputes relating to electric line clearance.

Part 3: Electric line clearance

This Part of the Code sets the clearance spaces required around all electric lines. Clearance spaces are set separately in relation to:

1. Aerial bundled cable and low voltage insulated service lines;
2. Low bushfire risk areas;
3. Hazardous bushfire risk areas; and
4. Transmission lines.

The clearance spaces are set out in a number of tables, with differentiation according to a range of criteria including the length of the span between poles, the nominal voltage of the line and whether lines are bare or covered.

The prescribed clearance spaces are determined according to technical considerations as follows:

- The flashover distance under which electricity will bridge the gap and escape to the tree branch or leaves is relevant. The higher the voltage, the greater the gap that needs to be maintained. This means that the clearance space is dependent on how the line will behave in high winds during storms. For example, lines can sway towards trees, while trees can also sway toward lines. The degree of line sag is important in determining relevant clearances. For instance a 220kV line on a cold day with little electricity load being carried by that line will on a hot day and carrying very high electricity load have a difference in sag of around 4 metres. This means that a tree height under a transmission line must make allowance for this variation. Technical calculations have been carried out to determine the clearance spaces for these conditions.

- For electric power lines on poles, the distance between the poles determines the level of trees clearance necessary (to allow for increased line sag caused by gravity and line sway during winds). The technical term is ‘mean equivalent span’, and this factor determines the clearance space for these electric lines. In urban areas the distance between poles is much less than in rural areas where distances between pole structures can be three or four times those for urban areas. Clearance spaces in rural areas are therefore greater.

- Where insulated cables are strung on poles, the clearance space has been further reduced as the electrical hazards are reduced..

- The frequency of cutting also determines the cutting distance to ensure that the required clearance space ‘is maintained at all times’, allowing for the estimated rate of vegetation regrowth. In urban areas the frequency is usually 12 months, and occasionally 18 months to 2 years. (This is identified in their management plans.) Rural areas maintain a 3-year cycle. Based on their management plans, the electricity businesses also undertake annual inspections in rural areas to ensure that they maintain a low bushfire risk. The level of cutting required after these inspections suggests that the abovementioned additional cutting distance is not excessive.

Clause 13 sets specific line clearance requirements with respect to transmission lines. It applies to all electric lines that are designed to operate at a voltage greater than 66,000 volts and includes 66,000 volt lines that are located on a tower line. The specification of separate requirements for this group of lines reflects the fact that the consequences to the public from fires caused by, or in the vicinity of, a transmission line can be considerably more severe than fires caused by powerlines. The consequences include:

- The possible loss of electricity supply to vast areas of Victoria;
- The increased risk of electrical discharge from a transmission line to nearby trees, despite adequate separation between the transmission line and the trees;
- The increased risk of electrical discharge from the transmission lines to members of the public and emergency workers operating within the transmission line easements.

The Code imposes a requirement to manage the volume and variety of trees that are located in a transmission line easement; and it specifies a clearance space for 66,000 volt electric lines that are supported by tower structures. In practice, the space that has been kept clear of trees in the vicinity of such lines has been much greater than the specified clearance space. This is because these lines are usually located with higher voltage transmission lines (increasing the risk of flashovers);[139] and so the transmission clearance requirements for similar span lengths to lines supported by tower structures have been used.

Transmission businesses have been consulted about the clearance spaces in the proposed regulations.

5.2. Comparison of proposed and existing regulations

A summary comparison of the substantive differences (other than wording and changes of penalty) between the existing regulations and the proposed new regulations is given in Appendix 1 to this RIS. The more significant changes are in six main areas:

1. Under the proposed regulations, only major electric companies[140] will need to submit their management plans to ESV for approval; whereas under the existing regulations, all responsible persons (except for land occupiers) need to submit their management plans to ESV for approval. Consistent with modern safety risk management, this is part of a change of emphasis from approval to auditing of safety management plans. The primary responsibility for the preparation of adequate plans should rest with the operator rather than the regulator. Major electric companies are an exception, because of the potential severe consequences of non-compliance to Victorian communities[141].
2. The definition of environmentally or culturally significant trees is more specific under the proposed regulations, and the new clause 2(3) of the Code restricts the

[139] Refer to Part 2.1.1 of this RIS.
[140] Transmission and distribution companies
[141] See Part 4.3.3 of RIS for discussion.

cutting of these trees to the minimum extent necessary. Greater protection is to be given to:

- areas of native trees, trees of ecological, historical or aesthetic significance or trees of cultural or environmental significance;
- vulnerable, endangered or critically endangered faunal species under the **Flora and Fauna Guarantee Act 1988**. [142]

As a result of these changes, the advice of a qualified arborist or horticulturalist will no longer be required before cutting or removal of these trees under the proposed regulations.[143]

3. Responsible persons would need to notify and consult occupiers or owners of private land or affected persons (as the case requires) before pruning or clearing vegetation under the proposed regulations. The existing regulations require firms to either obtain permission or to give at least 14 days written notice to occupiers or owners of private land or affected persons before cutting or removal of vegetation. As part of the permission seeking process, it is assumed that there are, at times, some negotiations between responsible persons and occupiers/owners of private land/affected persons about a variety of issues (including: the nature of the cutting or removal; when it will occur; special trees; access to property etc). Negotiation is, of course, a natural consequence of many situations where permission is required by one party from another. ESV has no empirical data in relation to the number, duration or frequency of these negotiations. It is possible that negotiations occur each year with some land owners or occupiers. An example of a need for negotiation might be that a landowner does not want to allow access to their property; however, the responsible person can comply with the regulations only by accessing the land to allow physical access to the trees and to do so in a safe manner. These negotiations can be an important aspect of obtaining permission as land owners of even small parcels of land can hold up major works or cause re-visits. This is particularly the case where the land is in remote areas or fire prone areas. Finally notification and consultation under the proposed regulations can be by written notice or newspaper advertisement; whereas under the existing regulations, consultation by newspaper advertisement is permitted only after taking reasonable steps and being unable to give *written* notice.
4. Under the proposed regulations, minimum clearance spaces surrounding aerial bundled cable or insulated cable will also apply to small tree branches; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.
5. Under the proposed regulations, minimum clearance spaces surrounding powerlines in hazardous bushfire risk areas will apply to tree branches above a

[142] See Part 4.3.4 of RIS for more detailed discussion.

[143] However, the advice of a qualified arborist or horticulturalist will still be required regarding risks from hazard trees under proposed clause 3.

powerline of 22,000 volts; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.

6. Although not a major difference, the penalty for a breach of proposed subregulation 9(4) will be increased from 10 penalty units (i.e $1,168.20 in 2009/10) to 20 penalty units (i.e. $2,336.40 in 2009/10), bringing it into line with other penalties imposed by the proposed regulations. This subregulation relates to the requirement on major electric companies to ensure that a management plan is prepared and submitted to ESV by the specified time, which is now 31 March in each year. Under section 157(3) of the Act, 20 penalty units is the maximum penalty that can be imposed for a breach of the regulations. Management plan requirements help to safeguard public safety and the reliability of power supplies, and it is appropriate that the penalties reflect their importance to the greatest available extent. The other offence provisions ensure that all duties set out in the proposed regulations are enforceable, which is not the case with some duties in the existing regulations.

As estimated in Part 4.3 of this RIS, the difference in 5-year incremental benefits between the exisiting and proposed regulations are set out in Table 31. The proposed regulations would provide an additional 5-year incremental benefit of **$112.99m** over and above the existing regulations.

Table 31: Comparison of 5-year incremental benefits of existing regulations and Code (Option B) and proposed regulations and Code (Option D) – as compared to the base case

Benefit category	Option B (existing regulations) 5-year benefit (2009 dollars)	Option D(proposed regulations) 5-year benefit (2009 dollars)
PUBLIC SAFETY BENEFITS		
Reduction in bushfire related death	$1,481,389	$2,222,083
Reduction in electrocution related death	$168,863	$253,294
Reduction in bushfire related injuries	$52,407	$78,610
Total public safety benefits	**$1,702,659**	**$2,553,988**
ECONOMIC ACTIVITY BENEFITS		
Reduced general economic loss including loss of community services due to reduced loss of power from *distribution lines*	$214,281,196	$321,421,794
Reduced general economic loss including loss of community services due to reduced loss of power from *transmission lines*	$640,182,157	$640,182,157
Reduced paid insurance claims/fire suppression & recovery costs/commercial costs	$3,015,380	$4,523,071
Total economic activity benefit	**$857,478,733**	**$966,127,021**
CONSERVATION BENEFITS		
Total conservation benefit	**$3,328,380**	**$6,823,180**
Total 5-year incremental benefit	***$862,509,772***	***$975,504,189***

As estimated in Part 4.3 of this RIS, the difference in 5-year incremental costs between the existing and proposed regulations is set out in Table 32. The proposed regulations and code would provide ***$22.25m*** more cost than the existing regulations and code.

Table 32: Comparison of 5-year incremental costs of existing regulations and Code (Option B) and proposed regulations and Code (Option D) – as compared to the base cases

Compliance and administrative cost	Option B (existing regulations) 5-year incremental cost (2009 dollars)	Option D (proposed regulations) 5-year incremental cost (2009 dollars)
Development of management plans by other responsible persons under sec.84 of the Act	$97,759	$88,872
Updating management plans by transmission businesses	$198,662	$180,602
Updating management plans by distribution businesses	$327,793	$297,993
Updating management plans by other responsible persons under sec.84 of the Act[144]	$737,760	$670,691
Providing written notification to affected persons in relation to cutting and removal of vegetation by transmission businesses (*proposed clause 5*)	$291,515	$21,057
Providing written notification to affected persons in relation to cutting and removal of vegetation by distribution businesses (*proposed clause 5*)	$28,928,285	$205,894
Providing written notification to affected persons in relation to cutting and removal of vegetation by other responsible persons under Sec.84 of the Act (*proposed clause 5*) [145]	$4,484,261	$1,342,344
New development of dispute resolution procedures (*proposed clause 9*)	$10,732	$10,732
Omission of *existing clause 9.2.1* and *9.2.2* and cost for electricity distribution businesses	$0	$19,605,517
Omission of *existing clause 9.2.1* and *9.2.2* and cost for other responsible persons under sec.84 of the Act	$0	$14,991,057
Omission of *exisiting clause 11.2* and the cost for electricitiydistribution businesses	$0	$19,911,381
Auditing costs for ESV	$798,000	$798,000
Additional duties of local councils, the Roads Corporation and others *(proposed clause 7)*	$447	$447
Management procedures to minimise danger for distribution businesses *(proposed clause 8)*	$106,937	$106,937
Notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*) and cost for distribution businesses	$78,249	$78,249
Total 5-year incremental cost	***$36,060,401***	***$58,309,774***

Finally, as shown by Table 28 in this RIS, Option D would provide approximately ***$86.93m*** worth of additional net benefit as compared to Option B.

5.3. Enforcement and compliance

Energy Safe Victoria (ESV) aims to encourage compliance with the Act and regulations through education and co-operation. However, in some instances, it is necessary for ESV to take action to enforce compliance and ensure public safety.

[144] Annual cost for 2010/11 reported.
[145] Annual cost for 2010/11 reported.

ESV has a regular program of auditing management plans prepared by responsible persons, and of compliance with those plans. Outcomes of audits include no further action; education and advice on improving compliance; or where breaches are suspected, the initiation of an enforcement investigation. Where offences against the Act or the Regulations are detected, authorised officers are empowered to issue non-compliance letters, or to issue proceedings by summons, depending upon the circumstances and evidence in each case. In enforcing the requirements of the Acts and the associated regulations, ESV will be guided by the following principles:

- Enforcement will be undertaken in a fair, predictable and consistent manner;
- Enforcement will be applied consistently to individuals and companies (as far as practicable);
- Enforcement will be undertaken using lawful procedures ;
- The emphasis in administration and enforcement will be on ensuring public safety and compliance with the Act and Regulations; and
- The primary purpose of enforcement measures is to stop activities that risk electrical safety by making offenders accountable as a deterrent to those involved and to others who may not be complying with the Acts and the regulations.[146]

In all cases, regardless of the offence(s), discretion to prosecute or take other enforcement action exists. Discretion is the free exercise of judgment to choose between possible causes of action or non-action, in situations not clearly requiring mandatory action by law, policy or directive. Appropriate considerations in exercising discretion include:

- the seriousness of the offence;
- the extent of injury to persons or damage to property;
- risk to public safety; and
- the past record of the offender.

Enforcement options considered by ESV may include the following:

- No action;
- Warnings;
- Directions - instructions to take certain action or provide information or materials;
- Infringement Notices - fines for selected offences;
- Prosecution - via the Court system.[147]

Section 90 of the Electricity Safety Act provides for significant penalties (up to $29,205 for companies) for non-compliance with the prescribed provisions of the Code. Proposed regulation 8 prescribes certain provisions of the Code as penalty provisions under section 90. There are also penalties for non-compliance with management plans.

[146] ESV web site <http://www.esv.vic.gov.au/AboutESV/TheroleofESV/tabid/138/Default.aspx>
[147] ESV web site <http://www.esv.vic.gov.au/AboutESV/TheroleofESV/tabid/138/Default.aspx>

The number of offences detected per year is small in comparison with the likely number of audits and investigations. There are two possible interpretations of this relatively small number of offences. One interpretation is that the number of offences against the regulations is so small that the regulations may be unnecessary. Against this interpretation is the fact that some of these offences could result in serious risks to public safety (see Part 2.1 of this RIS).

The alternative interpretation is that the existing regulations have been successful in deterring a higher number of offences. Even where warnings are issued, the existence of the regulations and the possibility of a court summons underpins the effectiveness of the warning. Warnings are generally useless unless there are legal consequences for failure to heed them. For these reasons, it has not as yet been necessary to prosecute any responsible person for a breach of the regulations.

In this way, the regulations provide an effective and necessary deterrent against non-compliance. The current high rate of compliance outcomes (that is, close to 100% after advice and warnings) is expected to be continued under the proposed regulations.

Given the high degree of public acceptance and compliance with the existing regulations, there is no reason to assume that the implementation of the proposed regulations is not feasible.

5.4. Impact on small business

Where the costs of compliance with regulations comprise a significant proportion of business costs, small businesses[148] may be affected disproportionately by such costs compared to large businesses. However, in this case, the costs of the proposed regulations are unlikely to comprise a significant proportion of business costs.

The only small businesses affected by the proposed regulations and code are small private landowners such as farmers. One area where there is seemingly an 'inconvenience' to farmers is in relation to *proposed clause 2(3)* which requires a responsible person to, as far as practicable, minimise cutting of particular vegetation (i.e. where native and significant flora and fauna are affected). Practicable is a defined term under the Electricity Safety Act and includes consideration of both the magnitude of hazards and costs of dealing with those hazards.

However, this is neither a cost or inconvience. Under other legislation concerning native vegetation, a person must obtain a permit before cutting particular trees. Under this native vegetation legislation, there is a 'general exemption' from having to obtain permits on the basis that cutting is not excessive and that it is done in accordance with this code of practice (CoP). *Proposed clause 2(3)* therefore, allows a responsible person to come to a reasonable balance between the extent of cutting and the length of time between cutting cycles. Unlike the 'buffer zone' considered under Option F, *proposed clause 2(3)* does not force a responsible person to change long established, reasonable cutting cycles.

[148] The Australian Bureau of Statistics (ABS) definition of a small business is one that has less than 20 full-time employees.

If, however, a responsible person cuts more than is required to achieve clearance from the power lines plus an appropriate allowance for regrowth before the next cutting cycle, the effect of *proposed clause 2(3)* is that the responsible person is in breach of the CoP. If the responsible person is in breach of the CoP, the exemption lapses on two counts, excessive cutting and non-compliance with the CoP. The consequence of this is that the responsible person is then in breach of the native vegetation legislation for cutting without a permit and hence is subject to the relevant penalties under the native vegetation legislation. *Proposed clause 2(3)* thus protects native trees from excessive cutting *without imposing additional costs* and effectively operates as a 'soft' buffer zone.

5.5. Impact on administration burden

The proposed changes in the regulations would impose no administrative burdens on businesses greater than the $250,000 per annum threshold required by Government guidelines for the measurement of change in administrative burden.[149]

With respect to the affected businesses (i.e. responsible persons) – the only identifiable costs incurred by such firms to demonstrate compliance relates to the information requirements under *proposed reg.9* (requirements of management plans). However, *proposed reg.9* reduces the amount of information required to show compliance (i.e. is less prescriptive) than *existing reg.9*. For this reason, the administrative burden to business as a result of the proposed changes to regulation will in fact be negative.

It estimated that the annual cost of developing and updating management plans under *proposed reg.9* is $255,032 in 2010/11 (in 2009 dollars) (see Table A3.4 of Appendix 4). On the other hand, the same cost under *existing reg.9* is assumed to involve 10% more information requirements and therefore more hours of preparation, estimated to be $280,536 in 2010/11 (in 2009 dollars) (see Table A3.7 of Appendix 4). Therefore, the proposed reg.9 is expected to reduce administrative burden by at least ***$25,504*** in 2010/11.

5.6. Comparison with other jurisdictions

A comparison of the burden of the proposed Victorian regulations with equivalent regulations in other Australian states and territories is as follows.

As Victoria is the jurisdiction with the highest risk of bushfire in Australia, and indeed is one of the most bushfire-prone areas in the world,[150] comparisons with other Australian jurisdictions do not necessarily involve comparing 'like with like'. The bushfire risk is not as high in northern and western Australia as it is in the southern and eastern states. For these reasons, the following comparison with the proposed Victorian regulations is confined to South Australia, New South Wales, Queensland and Tasmania.

South Australia

To protect people from the risks of bushfires and electrocution, clearance zones, buffer zones and planting restrictions near powerlines have been established in the South Australian *Electricity (Principles of Vegetation Clearance) Regulations 1996* under the **Electricity Act 1996**.

[149] State Government of Victoria, 2007
[150] Refer to Part 2.1.2 of this RIS.

Under Section 55 of the Act, electricity entities, Councils and occupiers of private land have a duty to take reasonable steps to keep vegetation clear of powerlines in accordance with the principles of vegetation clearance, which are prescribed in Regulation 5 as follows:

> (1) The principles of vegetation clearance set out in this regulation are prescribed for the purposes of Part 5 of the Act and govern the duty of an electricity entity or a council to clear vegetation from around powerlines.
> (2) Inspection and clearance of vegetation must take place at intervals of no longer than three years.
> (3) Vegetation must be cleared from within the clearance zone that surrounds the powerline as at the time of that clearance and beyond that zone so that—
>
> (a) no part of the vegetation is likely to bend into that zone in winds that might reasonably be expected in the area; and
> (b) no growth or regrowth of the vegetation is likely to intrude into that zone before the next scheduled inspection and clearance.
>
> (4) An electricity entity must not clear vegetation—
>
> (a) beyond the buffer zone (if any) around the powerline; nor (b) more than is reasonably necessary for the purposes set out in this regulation and for the purposes of enhancing the appearance and ensuring the stability and health of any remaining vegetation.
>
> (5) However, an electricity entity may clear vegetation beyond those limits (but is not under any duty to do so) at the request of the occupier of the land on which the vegetation is situated.
> (6) A request under subregulation (5) does not authorise clearance of vegetation that would be contrary to the provisions of any other law if carried out by the occupier.

The South Australian clearance spaces are not significantly different to those that apply in Victoria, except that South Australia has wider spaces for the longer spans (>200m) associated with South Australia's distribution network. However, the buffer zones, in effect, place a maximum limit on the amount of cutting or removal of vegetation, in addition to the minimum limits prescribed by the clearance spaces. These buffer zones entail more frequent cutting and protect all trees, not just native trees or trees of environmental or cultural significance. The relative costs and benefits of the South Australian buffer zone scheme, as it would apply to Victoria, are assessed in Part 4.3.5 of this RIS.

South Australia has no equivalent requirement to Victoria's management plans. The reason for this difference is unknown.

New South Wales

The equivalent primary legislation in New South Wales is the **Electricity Supply Act 1995.** Under this Act, the regulation dealing with tree clearance from powerlines is the *Electricity Supply (Safety And Network Management) Regulation 2008.*

Regulation 8 requires that a network operator must, if notified in writing to do so by the Director-General, lodge a network management plan with the Director-General, within such period as may be specified in the notice. The network management plan is to include a chapter on bush fire risk management. The objects of this chapter of the plan are as follows:

> (a) to ensure public safety,
> (b) to establish standards that must be observed when electricity lines operate near vegetation,

(c) to reduce interruptions to electricity supply that are related to vegetation,
(d) to minimise the possibility of fire ignition by electricity lines.

A network operator must ensure that its plan is audited in accordance with this Regulation at such times as the regulator may specify by notice in writing to the network operator. A network operator must lodge with the regulator a report prepared by the auditor in relation to that audit, as soon as practicable after the completion of the audit or within such other time as may be specified by the regulator by notice in writing to the network operator.

Queensland

The **Electrical Safety Act 2002** is the legislative framework for electrical safety in Queensland. The purpose of this Act is to prevent people from being killed or injured and property from being destroyed or damaged by electricity. Amongst other things, it establishes a framework that:

- imposes obligations on those who may affect the electrical safety of others
- establishes standards for industry and the public through regulations and codes of practice for working around electricity
- establishes safety management systems for electricity entities (including power authorities and Queensland Rail).

The Act is supported by the *Electrical Safety Regulation 2002* and various codes of practice. Amongst other things, this Regulation sets down:

- safety and technical requirements for electrical work, electrical equipment and the works of electrical entities
- safety and technical requirements for work in contract with or near exposed parts
- requirements for safety management plans
- notification and reporting requirements for serious electrical incidents and dangerous electrical events.

In particular, section 75 of the Regulations requires as follows:

> **75 Trimming of trees near overhead electric line**
>
> (1) The person in control of an overhead electric line must ensure that trees and other vegetation are trimmed, and other measures taken, to prevent contact with the line that is likely to cause injury from electric shock to any person or damage to property.
>
> (2) In this section--overhead electric line does not include an overhead electric line owned by an electricity entity.

Prescribed electricity entities are required under section 166 of the Regulations to have safety management systems in place, to have them independently audited and approved copies of the system and the audit certificate to the regulator, the Office of Fair and Safe Work Queensland. These safety management systems must also provide for—

- the making of modifications to the safety management system in accordance with the reasonable requirements of the regulator; and
- if reasonably required by the regulator, the auditing by an accredited auditor, in addition to the abovementioned auditing provided, and at the expense of the prescribed electricity entity, of how the entity is giving effect to the safety management system.

Tasmania

The Office of the Tasmanian Economic Regulator publishes and maintains the Tasmanian Electricity Code (the ELC Code), the first version of which was issued on 1 July 1998. The ELC Code sets out the detailed arrangements for the regulation of the Tasmanian electricity supply industry and is provided for and enforceable under the *Electricity Supply Industry Act 1995* (ESI Act), which is the principal Act governing the operation of the electricity supply industry in Tasmania.

Chapter 8A of the ELC Code covers Distribution Powerline Vegetation Management. Section 8A.3 specifies Distribution Powerline Clearance Standards, including clearance space dimensions. These clearance spaces are not significantly different to those that apply in Victoria, except that Tasmania has wider spaces for the longer spans (>200m) associated with Tasmania's hydro-electric power scheme.

Tasmania has no equivalent requirement to Victoria's management plans. The reason for this difference is unknown.

Comparison

Taking into account Victoria's geographical differences, and in particular the higher risk of bushfires occurring in Victoria, the proposed Victorian regulations are not unduly onerous compared to other Australian jurisdictions. All eastern and southern states impose a requirement on electricity distributors keep vegetation clear of electric lines, and where clearance spaces are prescribed, they not significantly different to those that apply in Victoria.

South Australia and Tasmania have no equivalent to Victoria's management plans, but the costs and benefits of management plans are assessed in Part 4 of this RIS.

6.0 National Competition Policy tests

6.1 Competition principles and guidelines

At the Council of Australian Governments (COAG) meeting in April 1995 (reaffirmed in April 2007), all Australian governments agreed to implement the National Competition Policy (NCP). As part of the *Competition Principles Agreement*, all governments, including Victoria, agreed to review all legislation containing restrictions on competition under the following principle:

> The guiding principle is that legislation (including Acts, enactments, Ordinances or regulations) should not restrict competition unless it can be demonstrated that:
>
> (a) the benefits of the restriction to the community as a whole outweigh the costs; and
>
> (b) the objectives of the legislation can only be achieved by restricting competition.[151]

To successfully pass the competition and cost-benefit tests, for each proposed regulation it is necessary to:

- Step 1:Identify the restriction on competition, if any;
- Step 2:Show that the restriction, if any exists, is necessary to achieve the objective;
- Step 3:Assess the costs to the community caused by the restriction;
- Step 4:Assess the community benefits; and
- Step 5:Assess whether benefits outweigh the costs.

If no restriction on competition is found in the course of Step 1, it is not necessary to complete the remaining steps (that is, Steps 2 to 5). Issues to be discussed in the NCP assessment relate to whether or not the proposed regulations restrict competition in the relevant market by one or more of various means such as:

- allowing only one company or person to supply a good or service (monopoly);
- requiring producers to sell to a single company or person (monopsony);
- limiting the number of producers of goods and services to less than four (duopoly or oligopoly);
- limiting the output of an industry or individual producers; or
- limiting the number of persons engaged in an occupation.[152]

6.2 NCP assessment

The relevant markets affected by the proposed regulations are in essence those related to the ownership and operation of electric lines. There are currently 2 transmission and 6 distribution businesses that own and operate major electric lines and who operate in the electricity transmission and distribution markets. For some responsible persons who own/operate electric lines such as VicRoads and various councils, Parks Victoria, Melbourne Water, alpine resort boards – competition is not a relevant issue due to

[151] COAG, 2007

[152] State Government of Victoria, 2005.

government ownership/involvement. Other relevant responsible persons would include 2 tram operators, and 2 tram museums operators, 1 electrical contractor, 1 gold mine operator, 1 airport operator (Melbourne Airport) and 15 wind farms.

All businesses owning and operating electric lines of the same type would be equally affected by the same regulatory environment. The proposed regulations (code) would impose the following costs:

- the one off costs of developing management plans (for example, an average cost of $4,921[153] per wind farm)
- the annual costs of updating management plans (an average of $20,000 for transmission businesses, $11,000 for distribution businesses and $1,330 for other responsible persons under Sec.84 of the Act)[154]
- the annual cost of notification and consultation via newspaper advertisment at $518.20 for a quarter page advertisment in a local newspaper under proposed clause.5 is estimated to be between $518.20 and $4,146 for a transmission business, and between $4,146 and $9,328 for a an electricity distribution business. For large councils the annual cost is also given as $4,146 per council for small councils the cost is only $518.20 per annum[155].
- the one-off cost of developing dispute resolution procedures (an average of $594.42[156])
- the cost of establishing additional clearance spaces due to omission of *exisitng clauses 9.2.1 and 9.2.2* which would have otherwise allowed for contact of light vegetation and branches under 10mm with electric lines under certain conditions. These costs are illustrated in the table below for electricity distribution companies (see Table A3.16 of Appendix 3 for source of estimates):

Electricity distribution company	Annualised cost for initial establishment of additional clearance spaces
Jemena NE	$521,156
SPI Electricity Pty Ltd	$1,201,435
Citipower	$688,800
Powercor	$1,070,592
United Energy Distribution	$858,954
Country Energy	$1,319

The cost of $3,320,240[157] for persons other than distribution businesses in terms of the need to establish additional clearance due to omission of *exisitng clauses 9.2.1 and 9.2.2.* This would include not only other responsible persons under sec.84 of the Act, of which there are 104[158], but also includes other private land occupiers in the State of Victoria.

[153] See Table A3.12 of Appendix 3 for source of estimate
[154] See Table A3.3 of Appendix 3 for source of estimates
[155] See Table A3.7 of Appendix 3 for source of estimates
[156] See Part 3.3 of Appendix 3 for source of estimate = 10hrs x $59.42
[157] See Part 3.5.2 of Appendix 3 for source of estimates
[158] See Table 1 in this RIS

- the cost of reconstructing power lines with insulated cables, or placing them underground or a combination of both due to the omission of *existing clause 11.1* (which would otherwise allow for vegetation overhang under certain conditions in hazardous bushfire risk areas). The cost to electricity distribution companies is illustrated below (see Table A3.17 of Appendix 3 for source of estimates):

Distribution business	Number of spans registered as overhanging the clearance space in HBRA's	Average cost of one-off investment per span (5 year investment)	Total annualised cost of lost regulatory exemptions
SPI Electricity Pty Ltd	2000	$8,750	$3,500,000
Powercor	20	$8,750	$35,000
United Energy Distribution	500	$8,750	$875,000

- the cost to distribution businesses under *proposed clause 8* of needing to advise occupiers of land who have a private electric line within its distribtution area of 'management procedures to minimise danger' of $23,685 per annum or $23,685/6 = ***$3,948*** per annum per distribution business (see Part 3.9.1. of Appendix 3 for source of estimate);

- the annual cost for electricity distribution businesses of notifying land owners, occupiers and affected persons of urgent pruning or cutting estimated to be $17,311 for five distribution companies or around ***$3,462*** per business per annum;

The above quantifiable costs would constitute only a very small fraction of the annual turnover of each business or a fraction of the enormous capital costs involved in owning and running an electric distribution/transmission; tram; electrical contracting; gold mine; airport; and wind farm business. Therefore, they would not restrict competition by creating a barrier to the entry of new businesses and are unlikely to restrict competition.

Consequently it can be said that the proposed regulations would not constitute a barrier to entry in any markets where businesses own and operate electric lines. The proposed regulations are therefore unlikely to restrict competition.

7.0 Evaluation strategy

The proposed regulations represent a continuation, with limited amendments, of a regulatory framework that has been in place in Victoria since 1984. Consequently, ESV (together with the ELCCC) has developed substantial experience in the implementation of these regulatory arrangements. Moreover, the participation of stakeholders as members of the ELCCC provides the basis for a systematic evaluation of this experience.

ESV expects to continue to adopt a collaborative and interactive approach in its relations with stakeholders and to use these relationships to identify any emerging regulatory issues and evaluate the ongoing performance of the regulations.

The effectiveness of the proposed regulations in achieving the policy objective (refer to Part 2.2) and any unintended consequences will be evaluated over time using the following indicators:

- incidence and severity of problems caused by vegetation contact with electric lines and flashovers;
- level of compliance with regulations;
- level of public complaints; and
- maintenance of stakeholder acceptance of regulations.

The ELCCC typically has four meetings per annum and reports on the performance of its function to the Minister by the end of September each year. Given the principal function of the ELCCC is to provide advice in regard to the preparation and maintenance of the Code of Practice, evaluation of the effectiveness of the Code prescribed by these regulations is best undertaken as part of this nominal quarterly cycle of meetings.

In respect of the specific indicators proposed:

- monitoring of vegetation contact problems and public complaints is a continuous activity undertaken via ESV's existing incident and complaint handling processes,
- level of compliance with the regulations is established via ESV annual audits of the electricity businesses and periodic but less frequent audits of other responsible persons, and
- stakeholder acceptance of the regulations is monitored via the ELCCC's quarterly meetings.

8.0 Conclusions

A summary of the main findings and conclusions of the RIS is as follows:

1. The problems underlying this regulatory proposal generally arise in relation to the following specific sources of risk arising from contact between electric lines and trees or other vegetation:
    - Extreme risks to public safety and property from bushfires;
    - Severe risks of loss of power supplies;
    - Safety risks to individuals from electrocution; and
    - Environmental risks from overcutting or excessive removal of vegetation.
2. The viable options assessed in terms of costs and benefits in this RIS are:
    - *Option A*: confine regulations to prescribing the Code only (the minimum regulation option);
    - *Option B*: remake the existing regulations and existing code;
    - *Option C:* the proposed regulations with the existing code;
    - *Option D*: the proposed regulations with the proposed new code;
    - *Option E*: the proposed regulations with the proposed new code (excluding *clause 5* regarding notification); and
    - *Option F*: a variation of the proposed regulations and code incorporating a different approach used in another jurisdiction, namely the buffer zones used in South Australia.
3. Option D (the proposed regulations and proposed Code) results in the highest net incremental benefit over 5 years of ***$917.19m***. This is followed by Option E (the proposed regulations and proposed Code without notification requirements) with a net incremental benefit of *$915.59m* over 5 years. Option F (the proposed regulations and proposed Code with a buffer zone requirement) provides a 5-year net incremental benefit of *$902.43m*. Option B (the existing regulations with the existing Code) and Option C (the proposed regulations with the existing Code) achieve roughly similar net incremental benefits over 5 years of *$830.27m* and *$830.39m*, respectively. Option A, (minimal regulations prescribing the existing Code only) results in the lowest net incremental benefit of *$141.52m* over 5 years.
4. The RIS finds that proposed regulations (Option D) would be the best option for achieving the policy objective as the benefits of the regulations (namely public safety, improved economic activity, and conservation) outweigh the costs. The proposed regulations and the proposed code are therefore the preferred option.

5. The proposed regulations and code would provide an additional 5-year incremental net benefit of **$90.75m** over and above the existing regulations and code (see Part 5.2 of this RIS).

6. The proposed regulations are expected to reduce administrative burden by at least *$25,504* in 2010/11.

7. Taking into account Victoria's geographical differences, and in particular the higher risk of bushfires occurring in Victoria, the proposed Victorian regulations are not unduly onerous compared to other Australian jurisdictions.

8. The proposed regulations would not constitute a barrier to entry in any markets where businesses own and operate electric lines. The proposed regulations are therefore unlikely to restrict competition.

9. In summary, the RIS concludes that that the proposed regulations:

- **are expected to impose costs on major electric companies, Councils, public land managers and private land occupiers;**

- **are expected to confer benefits in terms of minimising risks to public safety and power supplies, and to the conservation of threatened flora and fauna;**

- **are expected to confer the largest net incremental benefits of $917.19m in 2009 dollars as compared to the base case;**

- **would provide approximately $90.75m more *net incremental benefit* – in relation to the 'base case' as compared to the existing regulations and code;**

- **are not inequitable in terms of the distribution of costs and benefits; and**

- **do not restrict competition.**

Glossary of terms and acronyms

Act, the:	the **Electricity Safety Act 1998.**
aerial bundled cable	means an insulated electric line certified as being manufactured to Australian Standard AS 3560 or Part 1 or Part 2 of AS 3599;
affected person	means, in relation to the cutting or removal of vegetation on land, an owner or occupier (including a person who is responsible for the management of public land) of adjacent land where the cutting or removal will affect the use of that adjacent land;
arcing	when electricity jumps across a gap in a circuit.
away	in relation to a pole holding an electric line, means that section of the electric line that is not near the pole;
clearance space	space required to be clear of vegetation
competition:	the process of rivalry between independent firms or individuals in business. Competition occurs within a market.
common good:	a good that is non-excludable but rival. In other words, everybody has a right of access to common goods, but there is some competition for their use.
complex electrical installation:	means an electrical installation that— (a) has an installed generation capacity of equal to or greater than 1000 kVA; or (b) is an electric line that is on land that is not owned or leased by the owner or operator of the electric line;
constructed	includes reconstructed or structurally altered;
consult	means to provide an adequate opportunity to comment on a proposal, whether or not such comment is made.
cost recovery:	the recuperation of the costs of government-provided or funded products or services that, at least in part, provide private benefits to individuals, entities or groups, or reflect the costs their actions impose.
distribution line	means an electric line with a nominal voltage of 132 000 volts or less but does not include a transmission line, owned or operated by an electricity distribution company;
distribution system	means a network consisting of electric lines, generators, substations, circuits and any other thing required for the purposes of the distribution or supply of electricity
ELCCC:	Electric Line Clearance Consultative Committee
ESC:	Essential Services Commission
ESV:	Energy Safe Victoria.
economic efficiency:	when an output of goods and services is produced making the most efficient use of scarce resources and when that output best meets the needs and wants of consumers and is priced at a price that fairly reflects the value of resources used up in production.

electric line	(a) the whole or any part of a wire, cable or other thing used or to be used for the purpose of transmitting, distributing or supplying electricity; or (b) anything enclosing or supporting such a wire, cable or other thing— but does not include a wire, cable or other thing directly used in converting electrical energy into another form of energy;
equity:	in general, the term 'equity' reflects concepts of fairness or justice. In a public finance context, 'horizontal equity' refers to treating people in similar situations in similar ways. 'Vertical equity' refers to those with greater means contributing proportionately more than those with lesser means.
enforcement officer:	means a person appointed as an enforcement officer under Part 11 of the Act.
existing regulations, the:	the *Electricity Safety (Electric Line Clearance) Regulations 1999*
externality:	the cost or benefit related to a good or service that accrues to persons other than the buyer or the seller of that good or service.
flashover distance	the minimum distance between 2 points at different voltages which will result in an arc through the air
fixed costs:	costs that do not vary with the volume of business.
habitat tree	a tree that is the habitat for a vulnerable, endangered or critically endangered species under the **Flora and Fauna Guarantee Act 1988**.
hazard tree	a tree that is assessed by a qualified arborist as likely to fall onto or otherwise come into contact with an electric line.
hazardous bushfire risk area	means— (a) an area that a fire control authority has assigned a fire hazard rating of 'high' under section 80 of the Act; or (b) any other area that is not an urban area unless a fire control authority has assigned to that area a fire hazard rating of 'low' under section 80 of the Act;
HBRA	hazardous bushfire risk area
insulated cable	means a low voltage, single or multi-core electric line covered by a non-conducting substance other than air, permanently providing resistance to the passage of current, or to disruptive discharges through or over the surface of the substance, to obviate danger of shock or injurious leakage of current;
low bushfire risk area	means— (a) an area that a fire control authority has assigned a fire hazard rating of 'low' under section 80 of the Act; or (b) an urban area within the meaning of the Act;
low voltage	means a voltage not exceeding 1000 volts alternating current or 1500 volts direct current;
near	in relation to a pole holding an electric line, means within a distance to the pole of 1/6th of the span of the electric line;
nominal voltage	means the voltage at which the electric line is designed to operate.

major electricity company:	means a distribution company or a transmission company.[159]
market:	an area of close competition between firms, or the field of rivalry in which firms operate.
market failure:	the situation which occurs when freely functioning markets, operating without government intervention, fail to deliver an efficient or optimal allocation of resources.
powerline	means an electric line with a nominal voltage of 66 000 volts or less but does not include a transmission line;
monopoly:	a market structure such that only one firm supplies the entire market.
NCP:	National Competition Policy.
negative externality:	the situation that occurs when production and/or consumption impose external costs on third parties outside of the market for which no appropriate compensation is paid.
positive externality:	benefits relating to a good or service that fall on others besides buyers and sellers of that particular good or service. Also known as positive spill-overs and neighbourhood effects.
prescribed:	prescribed by an Act or subordinate legislation.
public good:	a good or service that is non-excludable and non-rival. Although a public good is not diminished by other users, it will not be produced in private markets because there is no way for the producer to keep those who do not pay for the good or service from using it.
remove	means to cut and remove the whole of a tree or plant above ground level
restriction of competition:	something that prevents firms in a market or potential entrants to a market from undertaking the process of economic rivalry.
rival goods:	goods whose consumption by one consumer prevents simultaneous consumption by other consumers.
RIS:	Regulatory Impact Statement.
sag	in relation to a conductor, means the vertical displacement of the conductor below the point at which the conductor is attached to the supporting structure and includes any extra displacement caused by hot weather or high load current;
stakeholder:	an individual or group that has a vested interest in, or may be affected by, a project or process.
statutory rules:	regulations made by the Governor in Council and other instruments of a legislative character deemed by an Act or prescribed to be statutory rules.
sway	in relation to a conductor, means the horizontal displacement of the conductor caused by wind

[159] Does not include a distribution company or a transmission company, or a class of distribution company or transmission company, declared under section 3A of the Act not to be a major electricity company.

transmission line	means— (a) an electric line with a nominal voltage of more than 66,000 volts; or (b) an electric line operating at 66,000 volts that is supported on tower structures or that is adjacent to an electric line that has a nominal voltage greater than 66,000 volts;
vegetation	means the whole or any part of a tree or plant.
vegetation of cultural or environmental significance:	means trees or vegetation that is: (a) registered under the **Heritage Act 1995** or the **Aboriginal Heritage Act 2006**, or (b) flora or habitat of fauna listed as threatened in accordance with Section 10 of the **Flora and Fauna Guarantee Act 1988**, or (c) flora classified as 'endangered' or 'vulnerable' or habitat of fauna classified as 'vulnerable', 'endangered', or 'critically endangered' in the Department of Sustainability and Environment Threatened Species Advisory Lists.
variable costs:	costs that vary with the volume of business.

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Appendices

1. ***Appendix 1 - Summary of material changes from existing regulations***
2. ***Appendix 2 – Incremental benefits of Options A, B, C, D E & F (economic loss due to power loss and bushfires avoided)***
3. ***Appendix 3 – Incremental costs of Options A, B, C, D, E & F***
4. ***Draft Regulations***

Appendix 1 - Summary comparison of proposed with existing regulations

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
1	Objectives	1	No material change.	N/A
2	Authorising provisions	2	No material change.	N/A
3	Commencement	3	New commencement date	New regulations
4	Revocation	4	Latest regs revoked	New regulations
5	Definitions	5	New definitions of 'tree of cultural or environmental significance' etc.	To align the regulations with other legislation.
6	Prescribed voltage	6	Nil.	N/A
7	Prescribed Code of Practice	7	New code prescribed. Refer to Schedule.	Refer to Schedule.
8	Prescribed penalty provisions	8	Renumbering of clauses as a consequence of restructuring code. No material changes, except the addition of clause 9 of the code as a penalty provision.	Clause 9 of the code has been included as a penalty provision to deter non-compliance.
9	**Management plans**			
9(1)	Which 'responsible persons' are required to prepare management plans	9(1)	No material change (drafting change only).	N/A
9(2) and (4)	Preparation of management plans	9(2) and (3)	Under the proposed regulations only major electric companies[161] must submit their management plans to ESV for approval; whereas under the existing regulations all responsible persons (except land occupiers) must submit their management plans to ESV for approval. Penalties increased from	Consistent with modern safety risk management, this is part of a change of emphasis from approval to auditing of safety management plans. The primary responsibility for the preparation of adequate plans should rest with the operator rather than the regulator. Major electric companies are an exception because of the high risks to the wider Victorian

[160] That is, material changes in meaning or impact, other than drafting changes.
[161] Transmission and distribution companies.

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
			10 to 20 penalty units.	community. Increased penalties reflect these risks.
9(3)	*Contents of required management plans*			
9(3)(a) to (e)	Contact details and objectives of plan	9(4)(a) to (d)	No material change.	N/A
9(3)(f) and (g)	Identification of land	9(4)(f)	Map to identify location of areas of native trees, trees listed in a relevant planning scheme to be of ecological, historical or aesthetic significance or trees of cultural or environmental significance which may need to be cut or removed to ensure compliance with the Code of Practice.	Under the proposed regulation, only trees meeting these descriptions need to be identified, rather than all vegetation, all vegetation determined by the relevant municipal council to be important etc, or all vegetation that is the habitat of rare or endangered species as per the existing regulation. The proposed regulation is more precise and specific, and is likely to save unnecessary costs.
9(3)(h)	Methods to be used to identify trees specified in 9(4)(g)	9(4)(g)	None, except as a consequence of changes to 9(4)(g).	Consequence of changes to 9(4)(g).
9(3)(i)	Management procedures to ensure compliance with the Code.	9(4)(h), (i)	Greater emphasis on compliance with the Code.	The proposed regulation is more precise and specific.
9(3)(j)	Measures to be used to assess performance	9(4)(q)	No material change.	N/A
9(3)(k)	Details of audit processes	9(4(r)	No material change.	N/A
9(3)(l)	Qualifications and experience of persons cutting or removing vegetation	9(4)(m)	No material change.	N/A
9(5)	Submit copy management plans to ESV on request within 14 days	N/A	New sub-regulation	Part of the change of emphasis from approval to auditing of safety management plans.
9(6)	Provision of further information on request from ESV	9(5)	No material change.	N/A
9(7)	Amendment of management plans on request from ESV	N/A	New sub-regulation	Part of the change of emphasis from approval to auditing of safety management plans.
9(8)	Failure to comply with management plan	9(6)	No material change.	N/A
9(9)	Plan to available for inspection	9(7)	No material change.	N/A

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
10	Exemptions	10	No material change.	N/A
11	Infringement notices	5(b)[162]	New infringement penalties for failure to provide information and failure to make information available to the public. Penalty increased from 10 to 20 penalty units	To reflect the significance of the offences and to provide a greater deterrent against non-compliance.
12	Expiry	11	New expiry date	New regulations
Schedule	**Code of Practice for Electric Line Clearance**	**Existing Cl. No.**		
Clause	**PART 1—PRELIMINARY INTERPRETATION**			
1	Definitions	1.1	No material change.	N/A
	PART 2—CLEARANCE SPACE REQUIREMENTS FOR ALL ELECTRIC LINES			
2(1)	Clearance spaces for powerlines	2.1	No material change.	N/A
2(2)	Clearance spaces for transmission lines	2.2	New sub-clauses (a) and (b).	To minimise fire risks associated with fuel loads below transmission lines and falling trees.
2(3)	Cutting or removal of native trees and trees of cultural or environmental significance.	4.3	New clause restricting cutting of these trees to the minimum extent necessary.	To give greater protection to these trees and thus obviate the need for advice from a qualified arborist or horticulturalist.
3	Hazard tree	N/A	New clause to enable hazard trees[163] to be cut or removed if assessed by qualified arborist.	To codify existing industry practice for avoidance of foreseeable safety risks.
4	Habitat trees	N/A	New clause to protect vulnerable, endangered or critically endangered species under the **Flora and Fauna**	Relates to clause of 9(4)(f)(C) of existing regulations. Greater protection is to be given to breeding habitat of these species.

[162] Electricity Safety (Infringements) Regulations 2000

[163] Defined as likely to fall onto or otherwise come into contact with an electric line.

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
			Guarantee Act 1988.	Cutting or removal of trees to be undertaken outside of breeding season wherever practicable.
5	Notification and Consultation	3 and 4	Responsible persons must notify and consult rather than negotiate agreements with occupiers or owners of private land before cutting or removing trees. Notification and consultation can be by written notice or newspaper advertisement; whereas under the existing regulations, notification by newspaper advertisement is permitted only after taking reasonable steps and being unable to give written notice.	To ensure that reducing the risk of contact between trees and electric lines is not hindered by delays in negotiating agreements with occupiers and owners.
	URGENT CUTTING OR REMOVAL			
6(1)	Application		No change	
6(2)	Exceptions from notice and consultation requirements—urgent pruning or clearing	5	An additional exception where arborists assessment confirms imminent likelihood of contact between a tree and an electric line.	Related to clause 3 re: hazard trees.
6(3)	Notification of land owners, occupiers and affected persons	6.2	No material change.	N/A
6(4)	Recording details	6.3	No material change.	N/A
6(5)	Keeping records	6.4	Records to be kept for at least 5 years instead of 2 years.	Related to ensuring that records are available from one cutting cycle to the next .
6(6)	Requirements for urgent pruning or clearing – no cutting more than 1 metre beyond clearance space	6.1	No material change.	N/A
	ADDITIONAL CONSULTATION BY SPECIFIC BODIES			

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
7	Additional duties of local councils, the Roads Corporation and others	7	No material change.	N/A
8	Management procedures to minimise danger	8	No material change.	N/A
9	Dispute resolution	Reg No. 9(4)(s)	Less prescriptive. Now a prescribed penalty provision under section 90 of the Act.	Allows the use of existing dispute resolution organisations. Penalty introduced to reflect importance of dispute resolution processes.
	PART 3— ELECTRIC LINE CLEARANCE			
10	Aerial bundled cables and insulated cables in all areas	9, 12	Under the proposed regulations, minimum clearance spaces surrounding aerial bundled cable or insulated cable will also apply to small tree branches; whereas under the existing regulations these minimum clearance spaces do not apply under specified conditions.	These cables are not resistant to abrasion by branches.
11	Powerlines other than aerial bundled cable or insulated cables in low bushfire risk areas	10, 12	Same clearance spaces, with provision for longer spans, but no allowance for risk management approach in existing clause 12.	Removal of allowance for overhanging branches in order to increase public safety
12	Powerlines other than aerial bundled cable or insulated cables in hazardous bushfire risk areas	11, 12	Same clearance spaces, with one less category, but no allowance for risk management approach in existing clauses 11.2 and 12. Under the proposed regulations, minimum clearance spaces surrounding powerlines in hazardous bushfire risk areas will apply to tree branches above a powerline of 22,000 volts; whereas under the existing regulations these	Removal of allowance for overhanging branches in order to increase public safety

Proposed Reg. No.	Subject matter	Existing Reg. No.	Nature of change[160]	Reason for change
			minimum clearance spaces do not apply under specified conditions.	
13	Transmission lines	13	Same clearance spaces, with a simplified table, but less prescriptive on the frequency of cutting.	To provide more flexibility in cutting times.
	SCHEDULE TO CODE OF PRACTICE			
	Table 1 and Figures 1, 2 and 3		Refer to clauses 2 and 10	
	Table 2 and Figures 1, 4 and 5		Refer to clauses 2 and 11	
	Table 3 and Figures 1 and 5		Refer to clause 12	
	Table 4 and Figures 6 and 7		Refer to clauses 2) and 13	

Appendix 2 – Incremental benefits of Options A, B, C, D, E & F
(economic loss due to power loss and bushfires avoided plus conservation enhancement)

The purpose of this appendix is to estimate the incremental benefits of Options A, B, C, D (*the proposed regulations and code*), E and F as compared to the 'base case' (refer to Part 4.2 of this RIS). In quantifying the costs and benefits of the proposed regulations, the principal difficulty has been in obtaining appropriate quantitative data on which to base the cost and benefit calculations. In many cases this data simply does not exist. In other cases, where there are available data sets, these have been compiled by various authors over time for widely differing purposes. The data sets are consequently not directly comparable with each other in either the time span over which they are collected or in definition of parameters collected. For example, 'fire' could range from a small, contained asset fire like a pole top fire, to a 'fire start', to a 'ground fire', to a 'vegetation fire' all the way to a 'bushfire'. In this RIS therefore, where specific data has been absent, judgement has had to be exercised in the selection of available information to act as a 'proxy' data to enable the analysis to proceed.

The incremental benefits contained within this RIS are illustrative only. They are based on assumptions developed by ESV and illustrate that a small percentage reduction in the incidence of unplanned interruptions to power supply would generate significant cost savings (benefits).

The first part of the appendix discusses concepts and measurement issues relating to the cost of electricity supply interruptions and outages, for both transmission and distribution. The second part of the appendix estimates the benefits (cost savings) of avoidance of interruptions and outages to electricity supply due to vegetation. Finally, the appendix looks at the costs avoided under Options A, B, C, D, E and F which are associated with bushfires caused by electric lines.

Costs are expected under Options A, B, C, D, E and F as the likelihood of interruptions from distribution lines and outages from transmission lines, as well as the possibility of bush fires as a result of the interaction of vegetation with electric lines, is reduced, but not eliminated. Nonetheless, risk is reduced under Options B, C, D, E and F as compared to the base case, largely because of the regulated requirements for management plans - particularly with respect to:

- the prescribed contents of management plans;
- approval by ESV of complex plans prepared by major electric businesses; and
- the auditing of management plans.

The ESC recommended that measures and ratings applied to the 'health card' for electricity distributors be used as indicators of, amongst other things, the effective implementation of vegetation management plans[164]. Field observations found that having management plans is an effective process with only 'a few instances of trees growing

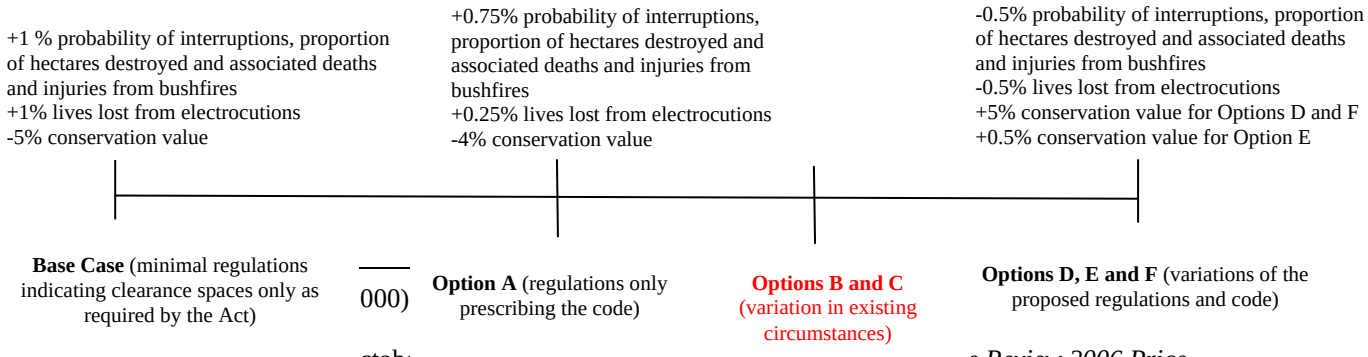
[164] Essential Services Commission (October 2005)

near to power lines'.[165] Importantly the management plan sets out a monitoring strategy for vegetation management[166] and are seen a risk-based approach to compliance with the code of practice and regulations.[167]

Furthermore, for the purposes of quantification, Options D, E and F are assumed to provide more quantifiable benefits than under Options B and C. The introduction of the *proposed Code* would provide less hindrance to reducing the risk of contact of vegetation with electric lines. Namely, the omission to *clauses 9.2.1* and *9.2.2* relating to small leaves and branches less than 10mm in diameter would ensure that in the case of aerial bundled cables and insulated services, vegetation is kept free at 'all times'. This would provide greater risk management particularly in the case where aerial bundled cables and insulated services are abraded over time increasing the risk of power loss, fires and electrocutions due to vegetation coming into contact. The issue with contact and abrasion is that while there may not be an immediate fire or other failure, insulation damage allows water ingress into the insulated cable over time and thus is the precursor to delayed failure at the damage site.

The omission of *clause 11.2* from the proposed code would mean that vegetation would no longer be allowed to overhang bare overhead power lines in hazardous bushfire risk areas (HBRAs)[168] under certain conditions. This would provide an additional avenue of risk reduction as compared with either Options B or C. This would impact directly and in future on interrruptions to electricity supply and bushfires (including death and injuries) and electrocution related deaths. As such, benefit factors (not including outages) under Options D, E and F (i.e. the proportion of interruptions arising due to interference from vegetation, the proportion of hectares destroyed by bushfires, amounts of deaths and injuries from bushfires) are reduced by an additional 0.5% beyond those under Options B and C (a 1.5% reduction in probabilities as compared to the 'base case'). It is assumed that Options D, E and F result in a 0.5% reduction in electrocution lives lost and 5% more total conservation benefit for the state – as compared to Options B and C (except for E which is only 0.5% more). The line chart below illustrates the relative treatement of various benefit factors (not including outages) under Options A, D, E and F as compared to Options B and C (variations in existing circumstances) for assessing the options agains the 'base case':

Line Chart 1: Relative treatement of Options A, D, E and F in relation to Options B and C for assessment against the base case for benefit factors (not including outages)



Singapore Power (21 Octob *e Review 2006 Price-Service Proposals for the Perioa 2006-2010*

[168] As determined by the Country Fire Authority (CFA)

Benefits for outages are treated the same under Options B, C, D, E and F as omission of the aforementioned clauses would have no impact on transmission lines which are clear felled.

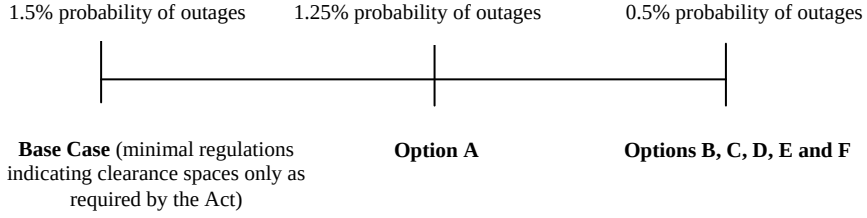
Furthermore, given the absence of:

- the prescribed contents of management plans;
- approval by ESV of complex plans prepared by major electric businesses; and
- the auditing of management plans,

under Option A, the incremental benefit factors (i.e. the proportion of interruptions and outages arising due to interference from vegetation, the proportion of hectares destroyed by bushfires and associated deaths and injuries from bushfires are increased by a factor of 0.75% more than under Options B and C (i.e. only a 0.25% improvement on the 'base case'). In fact, Option A does not recommend management plans whatsoever and the development and updating of such plans (including complex plans) would be purely voluntary and assumed to be part of a responsible persons 'own' risk management processes. Allowing more than a 0.25% improvement in benefit factor proportions as compared to the base case 'presumes' too much possible incremental benefit under an Option with no scope for compulsory management plan risk management strategies. Moreover, in this RIS it is assumed that Option A results in 0.25% more electrocution lives lost and 4% less total conservation benefit for the state – as compared to Options B and C.

With respect to outages line chart 2 compares the probability of outages arising from the interaction of vegetation with transmission lines under Options A, B, C, D, E and F versus the 'base case' – for the purpose of cost/benefit assessment. As shown, the treatement of probability for all the Opitions is identical (except for Option A) and therefore this benefit factor (outages avoided) does not have an impact on the choice of Option in the case of variations on the exisiting and proposed regulations and Code. The probability of outages under Option A is increased from 0.5% to 1.25% in order to reflect the increased risk of Option A as compared to all the other options. This is done to reflect the lack of approval process and audits of managment plans – which is seen to be one of the *most important* aspects of risk management and, therefore, benefits (i.e. cost savings) accuring.

Line Chart 2: Comparison of treatement of probability of outages under Options A, B, C, D, E and F and under the 'base case'



To avoid rounding error, the dollar amounts used in the calculations of this Appendix have not been rounded and have been calculated via spreadsheet. However, the resulting total amounts used in the body of the RIS have been rounded to the nearest single decimal place for simplicity of presentation.

2.1 The cost of electricity distribution interruptions due to vegetation – Options B and C

The cost of interruptions or outages to electricity supply is commonly discussed using the term *Value of Unserved Energy* (VUE)[169]. The measure of VUE can be broken down into two components:

- the *Value of Consumer Reliability* (VCR),[170]. VCR is defined as the weighted average measure of the economic cost to consumers for a given amount of unserved load[171] (i.e. the cost of being without an electricity supply). A wide range of customers is considered in the VCR measure, including residential, agricultural, commercial and industrial, as well as a wide range of interruption durations (up to 24hrs)[172]; and
- the *Value of Social Disruption (*VSD). VSD is defined as the economic cost to social services[173] across the state of Victoria in the event of outages.

The formula for interruption costs to electricity supply is given by:

$$VUE = VCR + VSD$$

The weighted state level or 'composite'[174] VCR for Victoria is estimated to be between $39.61/kWh and $63.39/kWh in 2009 dollars, as shown in Table A2.1.

Table A2.1: Estimates for weighted state level VCR, VSD and VUE – Victoria

Study	VCR $/kWh	VCR $/kWh (2009 dollars) (a)	VSD $/kWh	VSD $/kWh (2009 dollars) (b)	VUE $/kWh (2009 dollars) (c) = (a) + (b)
Monash University (1997)[175]	$28.89	$39.61[176]	$1	$1.06	$40.67

[169] Charles River Associates (CRA) International (2008)
[170] A term used interchangeably with the Value of Lost Load (VoLL) (see Concept Economics (2008))
[171] CRA International (2008)
[172] Jemena (2008)
[173] Services outside individual households and businesses and include community services such as emergency services (e.g. fire, police and ambulance services) health care services, transport (air/public/roads), communication, water and sewerage and waste disposal (CRA International (2008)).
[174] Weighted state level or 'composite' VCR is one which calculates a state wide level VCR by taking into account the sector weightings for residential, agricultural, commercial and industrial sectors of 34%, 1%, 34%, and 31%, respectively (see CRA International (2008)).

Study	VCR $/kWh	VCR $/kWh (2009 dollars) (a)	VSD $/kWh	VSD $/kWh (2009 dollars) (b)	VUE $/kWh (2009 dollars) (c) = (a) + (b)
CRA International for VENCorp (2007)[177]	$47.85	$50.56[178]	$1	$1.06	$51.61
DPI Victoria (June 2007)[179]	$60.00	$63.39[180]	$1	$1.06	$64.45

Table A2.1 also shows the Value of Social Disruption (VSD) estimated to be $1/kWh (2007 dollars)[181]. In 2009 dollars this is given as $1.06/kWh[182]. Therefore, the total state level[183] Value of Unserved Energy (VUE) is estimated to be between **$40.67/kWh** and **$64.45/kWh** in 2009 dollars, as shown in Table A2.1. For the purposes of estimation of VUE in this RIS, an arithmetic mean of ***$52.24/kWh*** is used.

SP AusNet and United Energy reported vegetation and animals as the second or third most important causes of interruptions, together accounting for 35 per cent of their respective total outages[184]. Powercor noted in 2000 that outages due to vegetation were not reducing and that the 'inability to get vegetation trimmed in a timely manner by local Shires in non-bush fire areas is likely to be impacting on supply reliability'[185]. These factors are likely to cause both unplanned sustained interruptions and momentary interruptions (interruptions less than 1 minute).

The Essential Services Commission's *electricity distribution comparative performance report 2007*[186] provides estimates for column (g) used for both Tables A.2.2 and A2.3, which are used to calculate the hours of interruptions to *electricity distribution*. The percentages are extrapolated from Figure 3.4 'Causes of Supply Interruptions' on page 25 of the report.

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[175] Khan, M.E. and M.F. Conlon (1997), *Value of Lost Load Study*, Report prepared for Victorian Power Exchange by Centre for Electrical Power Engineering, Monash University, Melbourne – cited in Essential Services Commission (April 2004), *Electricity Distribution Price Review 2006, Service Incentive Arrangements Consultation Paper No.2*, Victoria

[176] Adjustment based on a June 1997 Melbourne CPI index of 119.9 and a June 2009 index of 164.4 (See ABS (June 2009), Consumer Price Index, Cat.no. 6401.0)

[177] CRA International (2008)

[178] Adjustment based on a June 2007 Melbourne CPI index of 155.6 and a June 2009 index of 164.4 (See ABS (June 2009), Consumer Price Index, Cat.no. 6401.0)

[179] DPI (July 2007), *Review of 16 January 2007 electricity supply interruptions in Victoria: What happened and Why and Opportunities and recommendations*, Victoria. The figure of $60.00 is extracted from page 12, where it states 'The $60,000/MWh figure is also of potential interest to ongoing NEM development, as it represents a particular measurement of the Value of Lost Load (VoLL).'

[180] Adjustment based on a June 2007 Melbourne CPI index of 155.6 and a June 2009 index of 164.4 (See ABS (June 2009), Consumer Price Index, Cat.No. 6401.0).

[181] CRA International (2008).

[182] Adjustment based on a June 2007 Melbourne CPI index of 155.6 and a June 2009 index of 164.4 (See ABS (June 2009), Consumer Price Index, Cat.no. 6401.0).

[183] State level VUE refers to valuations by residential, agricultural, commercial and industrial consumers state wide.

[184] Essential Services Commission (April 2004).

[185] PB Australia Pty Ltd (September 2000).

[186] Essential Services Commission (October 2008): <http://www.esc.vic.gov.au/NR/rdonlyres/A58C8DE2-1617-45A2-AF48-AEE85DC63F8F/0/ElectricityComparativeReport200708.pdf>

2.1.1 Momentary interruptions (< 1 minute) from vegetation – Options B and C

Momentary interruptions are 'brief power outages lasting less than 1 minute caused by auto-reclose devices, which are installed on the network to restore supply following a transient fault. Such faults may be due to contact with birds, animals and vegetation, lightning or other causes'[187]. The number and total hours of momentary interruptions for 2007 is summarised in Table A2.2.

Table A2.2: Estimated total number of momentary interruptions/annum (assumed 30 seconds or 0.0083hrs on average) caused by vegetation + total hours – Options B and C

Distribution Company	Approximate momentary interruptions per customer per annum (2007)[188] (d)	Total no. customers (2007)[189] (e)	Estimated total no. momentary interruptions per annum (f) = (d)*(e)	Approximate proportion of interruptions due to vegetation[190] (g)	Estimated annual total no. momentary interruptions due to vegetation (h) = (f)*(g)	Estimated total annual no. hrs momentary interruptions due to vegetation (i) = (h)*0.0083hrs
Alinta AE[191]	0.8	295,000	236,000	3%	7,080	59
CitiPower	0.2	300,000	60,000	2%	1,200	10
Powercor	2.2	670,000	1,474,000	4%[192]	58,960	491
SPI Electricity	3.2	590,800	1,890,560	18%	340,301	2,835
United Energy	0.9	620,000	558,000	16%	89,280	744
Total		**2,475,800**	**4,218,560**		**496,821**	***4,140***

The formula for the estimated total number of hrs of momentary interruptions due to vegetation (column (i) in Table A2.2) becomes:

$$(i) = \{(d) \times (e) \times (g) \times 0.0083hrs\}$$

Where:

(d) = approximate number of momentary interruptions per customer per annum;
(e) = total number of customers;
(g) = approximate proportion of interruptions due to vegetation; and
0.0083hrs = average momentary interruption of 30 seconds.

2.1.2 Unplanned sustained interruptions (> 1 minute) from vegetation – Options B and C

Unplanned sustained interruptions are defined as interruptions to electricity distribution occurring for more than 1 minute. As shown in Table A2.3, the typical range of

[187] Essential Services Commission (April 2004), p.29.
[188] Essential Services Commission (October 2008) also known as the MAIFI index or the Momentary Average Interruption Frequency Index.
[189] Essential Services Commission (October 2008).
[190] Essential Services Commission (October 2008).
[191] Now known as Jemena Electricity Networks (Vic) Ltd
[192] Up from an average of 2.7% between 1997 and 1999 - see PB Australia Pty Ltd (September 2000).

unplanned sustained interruptions is between approximately 50 to 100 minutes. The estimated total hours of annual unplanned sustained interruption to electricity distribution for the state of Victoria is estimated to be 722,077hrs (see Table A2.3).

Table A2.3: Estimated total number of unplanned sustained interruptions per annum caused by vegetation and associated total hours – Options B and C

Distribution Company	Approximate unplanned interruptions per customer per annum (2007)[193] (j)	Total number of customers (2007)[194] (e)[195]	Estimated total number of unplanned interruptions per annum (k) = (j)*(e)	Approximate proportion of interruptions due to vegetation[196] (g)[197]	Estimated annual total number of unplanned interruptions due to vegetation (l) = (k)*(g)	Average duration of unplanned interruptions (minutes)[198] (m)	Estimated total annual no. hrs unplanned interruptions due to vegetation (n) = (l)*(m)/60
Alinta AE	1.8	295,000	531,000	3%	15,930	51	13,541
CitiPower	0.8	300,000	240,000	2%	4,800	103	8,240
Powercor	2.3	670,000	1,541,000	4%	61,640	90	92,460
SPI Electricity	2.8	590,800	1,654,240	18%	297,763	87	431,757
United Energy	1.5	620,000	930,000	16%	148,800	71	176,080
Total		**2,475,800**	**4,896,240**		**528,933**		***722,077***

The formula for the estimated total number of hrs of unplanned sustained interruptions due to vegetation (column (n) in Table A2.3) uses estimates for total number of customers and proportion of interruptions due to vegetation under Table A2.2 and is given as:

$$(n) = \{(j) \times (e) \times (g) \times (m)\}$$

Where:

(j) = approximate number of unplanned interruptions per customer per annum;
(e) = total number of customers;
(g) = approximate proportion of interruptions due to vegetation; and
(n) = average momentary interruption of 30 seconds.

The total number of hours of momentary and unplanned sustained interruptions based on the totals of columns (i) and (n) in Tables A2.2 and A2.3, respectively is estimated to be 726,217[199]. The demand of ***1kw*** is the estimate used by Sinclair Knight Mertz (1998) for their estimation of costs incurred by a residential customer[200]. Sinclair Knight Mertz (1998) estimated costs incurred by a commercial customer with an assumed demand of

[193] Essential Services Commission (October 2008)
[194] Essential Services Commission (October 2008)
[195] Taken from Table A2.2
[196] Essential Services Commission (October 2008)
[197] Taken from Table A2.2
[198] Essential Services Commission (October 2008)
[199] ***4,140hrs + 722,077hrs***
[200] Sinclair Knight Mertz (1998) cited in Sayers, C. and Shields, D. 2001

20kW during an interruption[201]. Furthermore, sector weightings for VCR measures for residential, agricultural, commercial and industrial sectors are given as 34%, 1%, 34%, and 31%, respectively (see CRA International (2008)).

Hence the weighted demand of kW per hour of interruption is taken to be 13.54kW:

$$1kW \times 34\%(residential) + 20kW \times 66\%\ (commercial) = 13.54kW$$

To put this weighted demand in context and establish that it is of an appropriate order of magnitude, the following examples of hourly demand for electrical power has been provided by ESV:

- domestic premises range from 14 kW (older houses) up to 24 kW total peak load. Appliances range from 0.2 kW for a TV, 2.4 kW for a toaster, and up to 3 to 6 kW for air conditioners;
- small shops and factories will have a PEAK load of about 24 kW with bakeries going up to 72 kW;
- larger offices have most of their load in lighting. A moderate office like ESV's Southbank premises will have about 3kW per floor in lighting. Computer printers will be about 0.7kW each; and
- larger factories can have massive demand depending on their operations.

The value of unserved energy (VUE) for momentary and unplanned sustained interruptions due to vegetation under the Options B and C is estimated to be 13.54kW x 726,217hrs x $52.24/kWh = ***$513,712,570*** per annum.

2.2 Estimated incremental benefits (VUE of interruptions avoided) under Options A, B, C, D, E and F as compared to the 'base case'

2.2.1 Benefit (VUE interruptions avoided) – Option B and C

The incremental benefit of Options B and C against the 'base case' in relation to VUE saved with electricity distribution are estimated in the following way. It is assumed that Options B and C entail a 1% lower proportion of interruptions from vegetation than under the 'base case'. This assumption is made due to data limitations adn ESV have noted that in the absense in the availablity of any real data a 1% variation is not inconsitent with the variation in probabilities between the distribution companies (up to 16% between the low and high figure in Table A2.2) in relation to interruptions caused by vegetation. This represents a reduction in the risk of interruptions under Options B and C. For momentary interruptions the following estimates for total hours of interruptions are made using columns (f) and (g) in Table A2.2, as shown in Table A2.4.

[201] Sinclair Knight Mertz (1998) cited in Sayers, C. and Shields, D. 2001

Table A2.4: Larger number and hours of momentary interruptions due to vegetation per annum under the 'base case' as compared to Options B and C

Distribution Company	1% higher proportion of interruptions from vegetation	
	Number	Hours
	(o) = (f)*((g)+1%)	(p) = (o)*0.0083hrs
Alinta AE	9,440	79
CitiPower	1,800	15
Powercor	73,700	614
SPI Electricity	359,206	2,993
United Energy	94,860	791
Total	**539,006**	**4,492**

In this estimation, 1% is added to column (g) in Table A2.2 and then multiplied by the number of interruptions (column (f) in Table A2.2). This is then multiplied by the number of hours of momentary interruption (0.0083hrs or 30 seconds) to provide the hours of interruption. The formula becomes:

$$(p) = (f) \times \big((g) + 1\%\big) \times 0.0083hrs$$

Where:
(p) = the hours of momentary interruptions;
(f) = the estimated total number of momentary interruptions per annum;
(g) = the proportion of interruptions due to vegetation; and
0.0083hrs = average momentary interruption of 30 seconds.

For unplanned sustained interruptions, the following estimates for total hours of unplanned sustained interruptions are made using columns (k) (g) and (m) in Table A2.3, as shown in Table A2.5.

Table A2.5: Larger number and hours of unplanned sustained interruptions due to vegetation per annum under the 'base case' as compared to Options B and C

Distribution Company	1% higher proportion of interruptions from vegetation	
	Number	Hours
	(u) = ((k)*(g)+1%)	(v) = (u)*(m)
Alinta AE	21,240	18054
CitiPower	7,200	12360
Powercor	77,050	115575
SPI Electricity	314,306	455,743.12
United Energy	158,100	187,085.00
Total	577,896	**788,817**

For the estimation of sustained interruptions, 1% is added to the proportion of interruptions due to vegetation in column (g) in Table A2.3 and then multiplied by the

number of sustained interruptions per annum (column (k) in Table A2.3). This is then multiplied by the number of hours of momentary interruption (column (m) of Table A2.3) to provide the hours of unplanned sustained interruption. The formula becomes:

$$(v) = (k) \times ((g) + 1\%) \times (m)$$

Where:
(v) = the hours of unplanned sustained interruptions;
(k) = the estimated total number of unplanned sustained interruptions per annum;
(g) = the proportion of interruptions due to vegetation; and
(m) = average hours of interruptions.

Finally Table A2.6 sums the level of momentary hours of interruption per annum in Table A2.4 with the unplanned sustained hours of interruption in Table A2.5 and compares the value of unserved energy (VUE) under the 'base case' with Options B and C. The formula for total number of hours of interruptions/annum (both momentary and sustained) in Table A2.6 becomes:

$$(p) + (v) = 4{,}492hrs + 788{,}817hrs = 793{,}309hrs$$

The total hours of momentary and unplanned sustained interruptions under the base case is then multiplied by the mean VUE of $52.24/kWh, as shown in the 4th row of Table A2.6. Finally the 5th row of Table A2.6 takes the VUE due to both momentary and unplanned sustained interruptions under Options B and C (see Part A2.1.2).

Table A2.6 Annual VUE of interruptions avoided (distribution) under Options B and C as compared to the base case – 2010/11 to 2014/15

Momentary hrs of interruption/annum under the base case	**4,492**
Unplanned sustained hrs of interruption/annum under the base case	788,817
Total hrs of interruption/annum under the base case	793,309
VUE Base Case (total hrs of interruption/annum(793,309 hrs)*$52.24/kWh*13.54kW demand/hr	$561,171,863.54
VUE Options B and C (total hrs of interruption/annum (726,217hrs)*$52.24/kWh*13.54kW demand/hr	$513,712,570.07
Total incremental VUE saved under Options B and C	**$47,459,293.47**

Therefore the incremental benefit (cost savings) of Options B and C over the 'base case' in terms of avoided interruptions to electricity supply (distribution) from vegetation is valued at approximately **$47.46m** per annum. Over 5 years and in present value 2009 dollars[202] this would equal ***$214,281,196.***

2.2.2 Benefit (VUE interruptions avoided) – Options D, E and F

The incremental benefit of Options D, E and F in terms of VUE interruptions avoided is assumed to be larger than under B and C, due to the omission of *clauses 9.2.1* and *9.2.2* and *11.2* as discussed earlier. To estimate the benefit of Options D, E and F against the 'base case' in relation to VUE saved with electricity distribution, the cost of interruptions under these options is established. The approximate proportion of interruptions is reduced for Options D, E and F in order to capture the additonal benefit. This represents a

[202] All present value calculations are preformed using a real discount rate of 3.5%.

reduction in the risk of interruptions under Options D, E and F which is larger than under Options B and C. As shown in Table A2.7 - for momentary interruptions and Table A2.8 for sustained interruptions, the proportion arising due to interference from vegetation in column (g) in Table A2.2 is reduced by 0.5%.

Table A2.7: Number and hours of momentary interruptions due to vegetation per annum under Options D, E and F

Distribution Company	Approximate momentary interruptions per customer per annum (2007)[203] (d)	Total no. customers (2007)[204] (e)	Estimated total no. momentary interruptions per annum (f) = (d)*(e)	Approximate proportion of interruptions due to vegetation[205] (g) – 0.5%	Estimated annual total no. momentary interruptions due to vegetation (h) = (f)*((g) -0.5%)	Estimated total annual no. hrs momentary interruptions due to vegetation (i) = (h)*0.0083hrs
Alinta AE[206]	0.8	295,000	236,000	2.5%	5,900	49
CitiPower	0.2	300,000	60,000	1.5%	900	8
Powercor	2.2	670,000	1,474,000	3.5%	51,590	430
SPI Electricity	3.2	590,800	1,890,560	17.5%	330,848	2757
United Energy	0.9	620,000	558,000	15.5%	86,490	721
Total		2,475,800	4,218,560		**475,728**	***3,964***

Table A2.8: Estimated total number of unplanned sustained interruptions per annum caused by vegetation and associated total hours – Options D, E and F

Distribution Company	Approximate unplanned interruptions per customer per annum (2007)[207] (j)	Total number of customers (2007)[208] (e)[209]	Estimated total number of unplanned interruptions per annum (k) = (j)*(e)	Approximate proportion of interruptions due to vegetation[210] (g) - 0.5%	Estimated annual total number of unplanned interruptions due to vegetation (l) = (k)*((g)-0.5%)	Average duration of unplanned interruptions (minutes)[211] (m)	Estimated total annual no. hrs unplanned interruptions due to vegetation (n) = (l)*(m)/60
Alinta AE	1.8	295,000	531,000	2.5%	13,275	51	11,284
CitiPower	0.8	300,000	240,000	1.5%	3,600	103	6,180
Powercor	2.3	670,000	1,541,000	3.5%	53,935	90	80,903
SPI Electricity	2.8	590,800	1,654,240	17.5%	289,492	87	419,763
United Energy	1.5	620,000	930,000	15.5%	144,150	71	170,578
Total		2,475,800	4,896,240		**504,452**		***688,707***

[203] Essential Services Commission (October 2008) also known as the MAIFI index or the Momentary Average Interruption Frequency Index.
[204] Essential Services Commission (October 2008).
[205] Essential Services Commission (October 2008).
[206] Now known as Jemena Electricity Networks (Vic) Ltd
[207] Essential Services Commission (October 2008)
[208] Essential Services Commission (October 2008)
[209] Taken from Table A2.2
[210] Essential Services Commission (October 2008)
[211] Essential Services Commission (October 2008)

The total number of hours of momentary and unplanned sustained interruptions based on the totals of columns (i) and (n) in Tables A2.7 and A2.8, respectively is estimated to be 692,672 in total. The loss of load in terms of kW per hour of interruption is taken to be 13.54kW[212]. The value of unserved energy (VUE) for momentary and unplanned sustained interruptions due to vegetation under the Options D, E and F is estimated to be 13.54kW x 692,672 hrs x $52.24/kWh = *$489,982,923* per annum. As shown in Table A2.9, the benefit (cost savings) of Options D, E and F over the 'base case' in terms of avoided interruptions to electricity supply (distribution) from vegetation is valued at approximately **$71.19** per annum. Over 5 years and in present value 2009 dollars[213] this would equal ***$321.42m.***

Table A2.9 Annual VUE of interruptions avoided (distribution) under Options D, E and F as compared to the base case – 2010/11 to 2014/15

VUE Base Case [214]	**$561,171,864**
VUE Options D, E and F	$489,982,923
Total incremental VUE saved under Options D, E and F	**$71,188,940**

2.2.3 Benefit (VUE interruptions avoided) – Option A

Under Option A, adherence to the *proposed code* is voluntary. On ESV advice it is taken that the rate of adherence for major electricity companies and other responsible persons under sec.84 of the Act is 90% and 20%, respectively. These proportions are based on general historical observations of compliance over the past few years as determined by audits and evaluation of plans by ESV. ESV therefore advises that under a voluntary scheme, this is what adherence rates would look like.

With this in mind, benefits are weighted according to:

- the proportion of the benefit owing to major electricity companies and other responsible persons under sec.84 of the Act as shown in Table A2.10; and
- the rate of adherence of responsible persons.

The general formula then becomes:

benefit x [(proportion of source of benefit from major electricity companies x rate of adherence major electricity companies (90%)) + (proportion of source of benefit from sec.84 responsible persons x rate of adherence by sec.84 responsible persons (20%)]

[212] See Part 2.1.2 for source of estimate
[213] All present value calculations are preformed using a real discount rate of 3.5%.
[214] See Table A2.6 for source of estimate

Table A2.10: Distribution of source of benefits in relation to economic activity arising from actions of major electricity companies and other responsible persons under sec.84 of the Act[215]

Type of benefit	Proportion of source of benefit relating to adherence of major electricity companies (a2)	Proportion of source of benefit relating to adherence of responsible persons under sec.84 of the Act (b2)
General economic loss from interrutpions avoided	95%	5%
General economic loss from outages avoided	100%	0%
Paid insurance claims[216]/fire suppression & recovery costs/commercial costs from fires avoided	95%	5%
Bushfire related death avoided	95%	5%
Electrocution death avoided	50%	50%
Bushfire related injury avoided	95%	5%
Conservation of flora and fauna	95%[217]	5%

With outages, these are due to failures or faults on large 'feeder' lines, predominantly transmission lines, for which the electricity businesses are responsible and hence have been allocated 100% to these businesses. With electrocution risks, the risks can arise from any electric line in contact with any tree, including in high population density urban areas, many of which are the responsibility of municipal authorities. These have therefore been allocated to the electricity businesses and other persons on a 50/50 basis. With other risks, these predominantly but not exclusively arise in rural/regional areas for which electricity businesses are responsible and have hence been allocated 95% to the electricity businesses.

The benefit (cost savings) of Option A over the 'base case' in terms of avoided interruptions to electricity supply (distribution) from vegetation is valued in the following way. The benefit of Option A, in this regard, is assumed to be less than under B and C in terms of interruptions avoided, due to absence of approval and audits of management plans (seen to be one of the most key factors in risk management in this RIS).

To estimate the benefit of Option A against the 'base case' in relation to VUE saved with electricity distribution, the cost of interruptions under this option is established. The

[215] All source of benefit proportions recommended by ESV except for electrocution death avoided and conservation of flora and fauna.
[216] May include life insurance however this is not an appropriate measure of the 'value of life' but rather the value of economic inconvenience or disruption to recipients of the claim payments due to a death or injury.
[217] It is assumed that environmental corridors provided by electric lines provide the most conservation benefits in rural areas which are mainly served by major electric companies.

approximate proportion of interruptions is increased for Option A (but still below base case levels) in order to capture the lower benefit. This represents a reduction in the risk of interruptions under Option A, as compared to the 'base case' which is less than under Options B and C. As shown in Table A2.11 - for momentary interruptions and Table A2.12 for sustained interruptions, the proportion arising due to interference from vegetation in column (g) in Table A2.2 is increased by 0.75%.

Table A2.11: Number and hours of momentary interruptions due to vegetation per annum under Option A

Distribution Company	Approximate momentary interruptions per customer per annum (2007)[218] (d)	Total no. customers (2007)[219] (e)	Estimated total no. momentary interruptions per annum (f) = (d)*(e)	Approximate proportion of interruptions due to vegetation[220] (g) + 0.75%	Estimated annual total no. momentary interruptions due to vegetation (h) = (f)*((g) + 0.75%)	Estimated total annual no. hrs momentary interruptions due to vegetation (i) = (h)*0.0083hrs
Alinta AE[221]	0.8	295,000	236,000	3.75%	8,850	74
CitiPower	0.2	300,000	60,000	2.75%	1,650	14
Powercor	2.2	670,000	1,474,000	4.75%	70,015	583
SPI Electricity	3.2	590,800	1,890,560	18.75%	354,480	2954
United Energy	0.9	620,000	558,000	16.75%	93,465	779
Total		2,475,800	4,218,560		**528,460**	***4,404***

Table A2.12: Estimated total number of unplanned sustained interruptions per annum caused by vegetation and associated total hours – Option A

Distribution Company	Approximate unplanned interruptions per customer per annum (2007)[222] (j)	Total number of customers (2007)[223] (e)[224]	Estimated total number of unplanned interruptions per annum (k) = (j)*(e)	Approximate proportion of interruptions due to vegetation[225] (g) + 0.75%	Estimated annual total number of unplanned interruptions due to vegetation (l) = (k)*((g) + (0.75%)	Average duration of unplanned interruptions (minutes)[226] (m)	Estimated total annual no. hrs unplanned interruptions due to vegetation (n) = (l)*(m)/60
Alinta AE	1.8	295,000	531,000	3.75%	19,913	51	16,926
CitiPower	0.8	300,000	240,000	2.75%	6,600	103	11,330
Powercor	2.3	670,000	1,541,000	4.75%	73,198	90	109,796
SPI Electricity	2.8	590,800	1,654,240	18.75%	310,170	87	449,747
United Energy	1.5	620,000	930,000	16.75%	155,775	71	184,334

[218] Essential Services Commission (October 2008) also known as the MAIFI index or the Momentary Average Interruption Frequency Index.
[219] Essential Services Commission (October 2008).
[220] Essential Services Commission (October 2008).
[221] Now known as Jemena Electricity Networks (Vic) Ltd
[222] Essential Services Commission (October 2008)
[223] Essential Services Commission (October 2008)
[224] Taken from Table A2.2
[225] Essential Services Commission (October 2008)
[226] Essential Services Commission (October 2008)

Total	2,475,800	4,896,240	**565,655**	***772,132***

The total number of hours of momentary and unplanned sustained interruptions based on the totals of columns (i) and (n) in Tables A2.11 and A2.12, respectively is estimated to be 776,536 hrs in total. The loss of load in terms of kW per hour of interruption is taken to be 13.54kW[227]. The value of unserved energy (VUE) for momentary and unplanned sustained interruptions due to vegetation under the Option A is estimated to be 13.54kW x 776,536 hrs x $52.24/kWh = ***$549,307,040*** per annum. As shown in Table A2.13, the annual benefit of Option A (unadjusted for adherence rates or source of benefit rates) over the 'base case' in terms of VUE avoided due interruptions to electricity supply (distribution) from vegetation is given.

Table A2.13: Annual VUE of interruptions avoided (distribution) under Option A as compared to the base case – 2010/11 to 2014/15 (unadjusted for adherence rates or source of benefit rates)

VUE Base Case [228]	$561,171,864
VUE Option A	$549,307,040
Total (unadjusted) incremental VUE saved under Option A	$11,864,823

The total (unadjusted) annual VUE saved under Option A in **Table A2.13** is modified using the weightings of rates of adherence (90% and 20%) and rates of the source of benefits in Table A2.10. The total annual VUE saved under Option A = $11,864,823 x [(95% x 90%) + (5% x 20%)] = **$10,263,072[229].** Over 5 years and in present value 2009 dollars[230] this would equal ***$46,338,309.***

2.3 The cost of electricity transmission outages from vegetation – Options B, C, D, E and F

The electricity transmission system of Victoria is owned and operated by SP AusNet. In order to estimate the average number of events and associated hours of outage in relation to transmission lines an average is used for the years 2005 to 2008 as shown in Table A2.14.

For the purposes of estimation the categories of 'fault', 'forced' and 'bushfires' are taken to represent sources of outages. Given that the proportion of outages associated with vegetation is unknown aproxy estimate based on the proportion of bushfires caused by public utilities (electric lines and train lines) is used. Ignitions from public utilities (i.e. electricity networks and trains) are considered to be the cause of 1% of bushfires between 1976/77 and 1995/96[231] as shown in Table A2.21. Given that the breakup of this 1% of ignitions between trains and electricity networks is unknown, only 50% of this 1% is taken to be representative of electricity networks, although ESV notes that this is likely to be more. For the purposes of estimation of economic benefits in terms of outages

[227] See Part 2.1.2 of Appendix 2 for source of estimate
[228] See Table A2.6 for source of estimate
[229] All values have been rounded to the nearest whole dollar for simplicity of presentation.
[230] All present value calculations are preformed using a real discount rate of 3.5%.
[231] ABS (2004) - Year Book Australia, Cat.No.1301.0. More recent ABS statistics are unavailable.

avoided and due to data limitations, this third order proxy is needed. Therefore, the proportion of outage events instigated by vegetation coming into contact with transmission lines is taken to be ***0.5%***. Whilst this is a main determinant of the level of incremental benefits it has no effect on the choice of the preferred Option as the proportion of outage events taken is identical to all Options B, C, D, E and F.

Table A2.14: Categories of transmission line outages including no. of events and associated hrs

Year	Categories of transmission line outages					
	Fault		Forced		Bushfires	
	No. of events (c1)	Hrs (d1)	No. of events (c1)	Hrs (d1)	No. of events (c1)	Hrs (d1)
2008[232]	67	2,741	38	321	1	16
2007[233]	75	519	25	126	7	53
2006[234]	124	4,065	62	532	16	255
2005[235]	52	4,489	36	748	0	0
Average	**79.5**	**2,954**	**40.25**	**431.75**	**6**	**81**

The cost of outages to transmission lines arising from vegetation is estimated using the following assumptions:

- the percentage of events in each category of outage attributable to vegetation is 0.5%[236];
- 10% of events are associated with major outages[237];
- a major outage has a duration of approximately 4 hrs[238];
- load lost per major outage is equal to 2000MW[239]; and
- load lost per minor outage is equal to 50MW[240].

Using the average number of events and hours of outages from Table A2.14, as well as the above assumptions regarding the role of vegetation and matters relating to major and minor outages, the value of unserved energy for transmission outages is estimated to be approximately ***$70.89m*** per annum (see Table A2.15).

[232] PB Australia Pty Ltd (March 2009) Audit of SP AusNet service standards performance reporting 2008, Australian Energy Regulator (AER).
[233] Sinclair Knight Mertz (SKM) (4 April 2008), Audit of SP AusNet Service Standards Performance Reporting: Performance Results for 2007, Final report, Australian Energy Regulator (AER).
[234] Sinclair Knight Mertz (SKM) (14 March 2007), Audit of SP AusNet Service Standards Performance Reporting: Performance Results for 2006, Final report, Australian Energy Regulator (AER).
[235] Sinclair Knight Mertz (SKM) (21 March 2006), Audit of SP AusNet Service Standards Performance Reporting: Performance Results for 2005, Final report, Australian Energy Regulator (AER).
[236] A proxy estimate based on 50% of the 1% proportion of bushfires caused by public utilities (electric lines and train lines) (see ABS (2004) - Year Book Australia, Cat. no. 1301.0).
[237] This assumption has been confirmed as reasonable by electrical safety experts in ESV.
[238] Typical example given in CRA International (2008).
[239] Typical example given in CRA International (2008).
[240] This assumption has been confirmed as reasonable by electrical safety experts in ESV.

Table A2.15: VUE from outages arising from vegetation interfering with transmission lines – Options B, C, D, E and F

Cat. of outage	0.5 % of events of outage due to vegetation (assumed) (e1) = (c1)*0.5%	hrs of outage associated with 0.5% of events (f1) = (e1)*(d1)/(c1)	Major outage hrs (assumed to be 10% of events) (g1) = (e1)*10%*4hrs	Minor outage hrs (assumed to be 90% of events) (h1) = (f1) – (g1)	MW load lost per major outage (assumed) (i1)	MW load lost per minor outage (assumed) (j1)	VUE (k1) = [(g1)*(i1)*1000*$52.24/kWh]+[(h1)*(j1)*1000*$52.24/kWh]
Fault	0.398	14.77	0.16	14.61	2,000	50	$54,773,727.66
Forced	0.201	2.16	0.08	2.08	2,000	50	$13,840,041.14
Bush-fires	0.030	0.41	0.01	0.39	2,000	50	$2,280,442.77
VUE Options B, C, D, E and F							**$70,894,211.57**

The formula for the Value of Unserved Energy (VUE) arising from vegetation interfering with transmission lines (k1) for a given category of outage is given by:

$$(k1) = [(c1) \times 0.5\% \times 10\% \times 4hrs \times (i1) \times 1000 \times \$52.24kWh] + \left[\left\{\left(\frac{(c1) \times 0.5\% \times (d1)}{(c1)}\right) - \left((c1) \times 0.5\% \times 10\% \times 4hrs\right)\right\} \times (j1) \times 1000 \times \$52.24kWh\right]$$

Where:

(c1) = Average no. events associated with a fault, forced or bushfire category of outages (see Table A2.7);
(d1) = Average no. hrs associated with a fault, forced or bushfire category of outages (see Table A2.7);
0.5% = proportion of events instigated by interaction of vegetation with transmission lines
10% = proportion of events which involve minor outages
4hrs = average number of hours involved in an outage
(i1) = MW load lost per major outage = 2000
(j1) = MW load lost per minor outage = 50
1000 = conversion factor to convert MW to kW
$52.24kWh = Mean VUE taken from Table A2.1

2.4 Estimated incremental benefits (VUE of outages avoided) under Options A, B, C, D and E as compared to the 'base case'

2.4.1 Benefit (VUE outages avoided) – Options B, C, D, E and F

To estimate the benefit of Options B, C, D, E and F against the 'base case' in relation to costs saved due to outages avoided, it is assumed that Options B, C, D, E and F result in 1% fewer numbers of outage events due to vegetation than under the 'base case'. Estimates for total hours of transmission outages due to vegetation are obtained from columns (e1) and (f1) in Table A2.15 and increased by 1%, as shown in Table A2.16.

Importantly, the choice of this increment for the 'base case' impacts equally agains B, C, D, E and F and therefore does not affect the choice of the preferred option.

Table A2.16: VUE from outages arising from vegetation interfering with transmission lines under the 'base case' (1% higher proportion of events than B, C, D, E and F)

Cat. of outage	1.5% of events of outage due to vegetation (assumed) (l1) = (c1)*1.5%	hrs of outage associated with 1.5% of events (m1) = (l1)*(d1)/(c1)	Major outage hrs (assumed to be 10% of events) (n1) = (l1)*10%*4hrs	Minor outage hrs (assumed to be 90% of events) (o1) = (m1) – (n1)	MW load lost per major outage (assumed) (i1)	MW load lost per minor outage (assumed) (j1)	VUE (p1) = [(n1)*(i1)*1000*$52.24/kWh]+[(o1)*(j1)*1000*$52.24/kWh]
Fault	1.193	44.30	0.48	43.83	2,000	50	$164,321,182.97
Forced	0.604	6.48	0.24	6.23	2,000	50	$41,520,123.41
Bush-fires	0.090	1.22	0.04	1.18	2,000	50	$6,841,328.31
VUE Base Case							**$212,682,634.70**

The formula for the Value of Unserved Energy (VUE) arising from vegetation interfering with transmission lines (p1) for a given category of outage is given by:

$$(p1) = [(c1) \times 1.5\% \times 10\% \times 4hrs \times (i1) \times 1000 \times \$52.24kWh] + \left[\left\{\left(\frac{(c1) \times 1.5\% \times (d1)}{(c1)}\right) - \left((c1) \times 1.5\% \times 10\% \times 4hrs\right)\right\} \times (j1) \times 1000 \times \$52.24kWh\right]$$

Table A2.17 compares the VUE under the 'base case' with the VUE under Options B, C, D, E and F and provides an additional benefit in terms of outages avoided of **$141.79m** per annum. This represents the VUE of outages avoided under Options B, C, D, E and F in relation to transmission lines. Over 5 years and in 2009 present value dollars[241], this would equal ***$0.64b***.

Table A2.17: Annual VUE of outages avoided (transmission) under Options B, C, D, E and F as compared to the base case – 2010/11 to 2014/15

VUE Base Case	**$212,682,635**
VUE Options B, C, D, E and F	$70,894,212
Total incremental VUE saved under Options B, C , D , E and F	**$141,788,423**

2.4.2 Benefit (VUE outages avoided) – Option A

In order to estimate the incremental benefit in terms of VUE outages avoided under Option A over the base case, the cost of VUE is first estimated. It is assumed that the percentage of events in each category of outage attributable to vegetation is increased from 0.5% (under Options B, C, D, E and F) to 1.25% (i.e. an adjustment is made to column (e1) in Table A2.15 now (ee1) in Table A2.18). This is done in order to reflect the increased risk of Option A as compared to all the other options - due to a lack of approval process and audits of managment plans – which is seen to be one of the most important aspects of risk management and, therefore, benefits accuring.

[241] Discounted using a real discount rate of 3.5%

Using the average number of events and hours of outages from Table A2.18, the value of unserved energy for transmission outages is estimated to be approximately ***$248.13m*** per annum under Option A (see Table A2.19).

Table A2.18: VUE from outages arising from vegetation interfering with transmission lines – Option A

Cat. of outage	1.25 % of events of outage due to vegetation (assumed) (ee1) = (c1)*(1.25%)	hrs of outage associated with 1.25% of events (f1) = (ee1)*(d1)/(c1)	Major outage hrs (assumed to be 10% of events) (g1) = (ee1)*10%*4hrs	Minor outage hrs (assumed to be 90% of events) (h1) = (f1) – (g1)	MW load lost per major outage (assumed) (i1)	MW load lost per minor outage (assumed) (j1)	VUE (k1) = [(g1)*(i1)*1000*$52.24/kWh]+[(h1)*(j1)*1000*$52.24/kWh]
Fault	0.994	36.92	0.40	36.52	2,000	50	$136,934,319
Forced	0.503	5.40	0.20	5.20	2,000	50	$34,600,103
Bush-fires	0.075	1.01	0.03	0.98	2,000	50	$5,701,107
VUE Option A							**$177,235,529**

Table A2.19 compares the VUE under the 'base case' (see Table 2.18) with the VUE under Option A from Table A2.19 and provides an benefit in terms of outages avoided of per annum (unadjusted for adherence rates or source of benefit rates).

Table A2.19: Annual VUE of outages avoided (transmission) under Option A as compared to the base case – 2010/11 to 2014/15 (unadjusted for adherence rates or source of benefit rates)

VUE Base Case	$212,682,635
VUE Option A	$177,235,529
Total (unadjusted) incremental VUE saved under Option A	**$35,447,106**

The total unadjusted VUE saved (i.e. outages avoided) under Option A in Table A2.20 is modified using the weightings of rates of adherence and rates of source of benefits in Table A2.10. The total annual VUE saved under Option A = $35,447,106 x [(100% x 90%) + (0% x 20%)] = **$31,902,395.** Over 5 years and in present value 2009 dollars this would equal ***$144,040,985.***

2.5 Incremental benefit of bushfire avoidance under Options A, B, C, D, E and F

Potential damages caused by bushfires include loss of life, injury, loss or damage to property, livelihood and emotional loss. Ignitions from public utilities (i.e. electricity networks and trains) are considered to be the cause of 1% of bushfires between 1976/77 and 1995/96[242] as shown in Table A2.20 and are responsible for 14% of the total area burnt.

For the purposes of this RIS 'Public Utilities' is used as a proxy category for the number of bushfire events and extent of damage caused by the interaction of vegetation and

[242] ABS (2004) - Year Book Australia, Cat.No.1301.0. More recent ABS statistics are unavailable.

electric lines under Options B and C (1984 to 1999)[243]. The proportion of the 14% represented by the interaction of vegetation with electric lines is unknown, but is believed to be the majority of this historical damage. In submissions to the Royal Commission on the Black Saturday 2009 bushfires, electricity assets are alleged to have been responsible for 112,473 ha of the 411,239 ha burnt or 27.34% in one day. Nevertheless for the purpose of estimation it is assumed that only 50% of the public utility ignitions are due to the electricity assets (i.e. only 0.5% of total ignitions and 7% of total hectares burnt).

Table A2.20: Causes of bushfires in Victoria (1976/77 to 1995/96)

Fire cause	Average no. of fires/year	% of total fires	Average area burnt ha/yr	% of total area burnt
Lightning	149	26	53,096	46
Deliberate	145	25	15,649	14
Agricultural	96	16	7,799	7
Campfires	59	10	1,466	1
Cigarettes/matches	41	7	444	<1
Cause unknown(a)	37	6	2,974	3
Miscellaneous(b)	26	5	10,009	9
Machinery/exhausts	15	3	2,551	2
Prescribed burn escapes(c)	9	2	5,274	5
Public utilities(d)	7	1	16,256	14
Total(e)	**584**	**100**	**115,518**	**100**

(a) Includes fires where investigators could not ascertain the cause, as well as fires where the cause was not investigated.
(b) Includes causes like: burning houses, burning buildings and fireworks.
(c) Management of parks and forests includes the use of planned fires for a variety of purposes such as natural fuel management and the maintenance of flora and fauna habitat. Sometimes these fires burn beyond the planned perimeter.
(d) Includes ignitions from trains and power transmission.
(e) All figures are rounded; hence may not add up to column totals.

Source: ABS (2004) - Year Book Australia, Cat.no. 1301.0

Bushfire costs under Options B, C are estimated using insurance claim payouts obtained from the Emergency Management Australia (EMA) Disasters Database, together with fire suppression and recovery costs and costs to commercial industry. However, these costs are only proxy measure of the total cost of bushfires, because they do not include other costs such as loss of life, injury, loss of livelihood or emotional loss. Table A2.21 provides details of significant bushfires in Victoria since the introduction of the Code of Practice in 1984 and the total amount of insured cost. Since the 'base case' does not allow for a non-regulatory option in relation to line-clearance,[244] the state of regulation or lack of regulation before 1984 is not relevant to the discussion of costs and benefits.

[243] The code of practice which is part of the 'base case' was introduced in 1984
[244] Refer to Part 4.2 of this RIS.

Table A2.21: Victorian Bushfires 1985 to 2009 – estimated costs

Date	Cause	Location	Lives lost	Injured	livestock dest-royed	Homes dest-royed	Bldgs dest-royed	Area Burnt ha.	Total estimated cost $m[245]	Total estimated cost $m (2009 dollars)[246]
14/01/85	**Lightning**	Maryborough, Little River, Springfield, Melton	5	15	46,000	180	500	50,800	5.5	13.475
27/12/90	**Unknown**	Strathbogie Ranges	1	5	13,500	16	150	0	12	18.507
01/11/94	**Unknown**	Lorne, Wilson's Promontory	0	1	0	1	1	0	0	0
01/10/95	**Unknown**	South-Western Vic	0	0	0	0	0	0	0.5	0.727
16/02/97	**Unknown**	Winton and Romsey	0	0	200	0	0	500	0	0
19/01/97	**Unknown**	Dandenongs and Mornington Peninsula	3	20	0	43	2	3,700	10	13.711
24/03/97	**Unknown**	Sunbury	0	0	0	0	0	100	0	0
31/12/97	**Unknown**	Caledonia	0	2	0	0	0	32,000	0	0
01/02/98	**Unknown**	Wilson's Promontory	0	0	0	10	50	1,600	0	0
22/03/98	**Arson**	Trentham	0	0	0	10	50	3,500	0	0
12/03/98	**Unknown**	Southern Victoria,	0	1	0	0	0	0	0	0
02/12/98	**Unknown**	Linton[247]	5	0	0	0	0	660	0	0
10/02/00	**Unknown**	Melbourne and NW	0	0	0	1	4	115	0	0
18/01/00	**Lightning**	Portland Region Warrnambool	0	0	0	0	0	1995	0.8[248]	1.065
28/11/00	**Unknown**	Horsham, Stawell, Ballarat Regions	0	3	4000	1	5	800	0	0
17/12/02	**Lightning**	Big Desert Wilderness Park[249]	0	0	0	0	0	181,400	0	0
08/01/03	**Lightning**	Eastern Victoria,	1	3	110,000	41	0	1,275,000	12[250]	14.193
31/12/05	**Unknown**	Melbourne, Mount Gambier, Warrnambool, Wilson's Promontory	4	6	64,265	57	359	160,000	22.4[251]	24.682
01/12/06	**Lightning**	Great Divide Complex	1	1,400	50,000[252]	0	0	1,048,000	14	14.994
07/02/09	**Unknown**	Black Saturday Victorian Bushfires Wilson's Promontory	173	0	5,223	2,029	2,588	411,239	1,020	1,020
Total			**193**	**1,456**	**293,188**	**2,389**	**3,709**	**3,170,494**		**1,469.271***

* Final findings of the 2009 Victorian Bushfires Royal Commission are yet to be made and total cost figure represents the value of claims which may or may not have been settled. Moreover, values for this fire are not treated as outliers given that this data point occurs at the end of the 22 year period and may be part of the trend.

Source: DSE, Victoria, and the Emergency Management Australia (EMA) Disasters Database

[245] Includes: insured cost; loss assessment cost and commercial industry cost; and fire suppression and recovery costs
[246] All figures are adjusted using Melbourne CPI indices (See ABS (June 2009), Consumer Price Index, Cat. No. 6401).
[247] http://www.dse.vic.gov.au/DSE/nrenfoe.nsf/LinkView/AAFBFA63BB99844C4A256B6C0082134DA0CE5941CA0421ACCA256DAB0027EC58
[248] Commercial cost of two pine plantations lost (295ha worth) of $800.000.
[249] http://www.dse.vic.gov.au/DSE/nrenfoe.nsf/LinkView/E20ACF3A4A127CB04A25679300155B04358FFCDA5CA1F43FCA256DA6000942C9
[250] Fire suppression and recovery cost was $201m.
[251] Commercial industry cost was $100m (cost to Grampians regional economy from tourism downturn resulting from the bushfire devastation).
[252] <http://www.ayton.id.au/gary/History/H_Aust_bushfires.htm>

Using Table A2.21, the area affected by electrical lines is estimated to be 7% of 3,170,494ha = 221,935ha. Using a pro-rata approach, the insurance cost for the years 1985 to 2009 (i.e. 22 years) would amount to $102,848,989 [253] (2009 dollars) or **$4,674,954**[254] per annum. Over 5 years and in 2009 dollars, the insurance cost of fires in terms of vegetation interacting with electric lines under Options B and C would be ***$21,107,662.***

2.5.1 Benefit in terms of 'insured' bushfire costs resulting from the interaction of vegetation with electric lines avoided under Options B and C as compared to the base case

The estimation of incremental benefit of Options B and C over the base case, assumes 1% fewer hectares destroyed and associated imputed bushfire costs under Options B and C (i.e. 1% more hectares destroyed under the 'base case'). As shown in Table A2.22 the value of reduced bushfire costs are established by taking the relevant area of hectares burnt (i.e. 7% of 3,170,494ha) from Table A2.21 and increasing the proportion caused by electric lines to 8% (i.e. increasing area burnt by 1%).

Table A2.22: Estimated annual fire cost saved under Options B and C as compared to the 'base case'

Area affected under the base case = 8% of 3,170,494ha	**253,640ha**
Annual cost of bushfires in the base case = area affected under the base case (253,640ha) x $1,469,271,276.41/3,170,494ha /22 years	$5,342,805
Annual cost of bushfires under Options B and C	$4,674,954
Total reduction of bushfire costs under Options B and C	**$667,851**

The annual incremental cost savings (not including death and injury avoided) would be **$0.67m** per annum. Over 5 years the incremental cost savings under Options B and C would be ***$3,015,380*** in 2009 dollars.

2.5.2 Benefit in terms of 'insured' bushfire costs resulting from the interaction of vegetation with electric lines avoided under Options D, E and F as compared to the base case

The incremental benefit of Options D, E and F is assumed to be larger than under B and C in terms of bushfire costs (not including death and injury) avoided, due to the omission of *existing clauses 9.2.1* and *9.2.2* and *11.2*. To estimate the benefit of Options D, E and F against the 'base case' in relation to bushfire costs saved, the cost of bushfires under these options is established first.

The approximate proportion of hectares destroyed is reduced for Options D, E and F in order to capture the additonal benefit due to the omission of existing clauses 9.2.1 and 9.2.2 and 11.2, as discussed earlier. This represents a reduction in the risk of bushfires

[253] 221,935ha x $1,469,271,276.41/3,170,494ha = $102,848,989

[254] $102,848,989/22 years. This value is significantly higher than the $0.04 million per annum as noted in the previous RIS for electrical line clearance in 2005 however the source of the $0.04m estimate is not given.

under Options D, E and F which is larger than under Options B and C. The asssumed hectares that would be burnt under Options D, E and F is assumed to be 6.5% of 3,170,494ha (see Table A2.21 for source of estimate) or 206,082ha. Using a pro-rata approach, the bushfire cost (not including death and injury) for the years 1985 to 2009 (i.e. 22 years) would amount to $95,502,633[255] (2009 dollars) or up to ***$4,341,029*** [256] per annum. Over 5 years and in 2009 dollars, the cost of bushfires in terms of vegetation interacting with electric lines under Options D, E and F (not including death or injury) would be up to ***$19,599,972.***

As shown in Table A2.23 the value of the annual incremental cost savings (not including death and injury avoided) would be approximately **$1m** per annum. Over 5 years the incremental cost savings under Options D, E and F would be ***$4,523,071*** in 2009 dollars.

Table A2.23: Estimated annual fire cost saved under Options D, E and F as compared to the base case

Annual cost of bushfires in the base case (area affected 253,640ha x $1,469,271,276.41/3,170,494ha /22 years) (see Table A2.22 for source of estimate)	**$5,342,805**
Annual cost of bushfires under Options D, E and F	$4,341,029
Total annual reduction of bushfire costs under Options D, E and F	**$1,001,776**

2.5.3 Benefit in terms of 'insured' bushfire costs resulting from the interaction of vegetation with electric lines avoided under Option A as compared to the base case

The incremental benefit of Option A is assumed to be smaller than under B and C in terms of bushfire costs (not including death and injury) avoided, due to the absence of approving and auditing management plans. To estimate the benefit of Option A against the 'base case' in relation to bushfire costs saved, the cost of bushfires under this option is established first.

The approximate proportion of hectares destroyed is increased (as compared to B and C) for Option A in order to capture the reduced benefit due to the absence of approving and auditing management plans, as discussed earlier. This represents a reduction in the risk of bushfires under Option A which is smaller than under Options B and C. The asssumed hectares that would be burnt under Options D, E and F is assumed to be 7.75% of 3,170,494ha (see Table A2.21 for source of estimate) or 245,713ha.

Using a pro-rata approach, the bushfire cost (not including death and injury) for the years 1985 to 2009 (i.e. 22 years) would amount up to $113,868,524[257] (2009 dollars) or ***$5,175,842*** per annum. As shown in Table A2.24 the (unadjusted) value of the annual cost savings (not including death and injury avoided) would be up to $0.17m per annum.

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[255] 206,082ha x $1,469,271,276.41/3,170,494ha = $95,502,633

[256] $95,502,633/22 years. This value is significantly higher than the $0.04 million per annum as noted in the previous RIS for electrical line clearance in 2005 however the source of the $0.04m estimate is not given.

[257] 245,713ha x $1,469,271,276.41/3,170,494ha = $113,868,524

Table A2.24: Estimated annual fire cost saved under Option A as compared to the 'base case' (unadjusted for adherence rates or source of benefit rates)

Annual cost of bushfires in the base case = area affected (253,640ha) x $1,469,271,276.41/3,170,494ha /22 years) (see Table A2.22 for source of estimate)	$5,342,805
Annual cost of bushfires under Option A	$5,175,842
Total (unadjusted) annual reduction of bushfire costs under Option A	**$166,963**

The total (unadjusted) annual bushfire cost saved under Option A in Table A2.24 is modified using the weightings of rates of adherence and rates of source of benefits in Table A2.10. The total annual bushfire cost saved under Option A = $166,963 x [(95% x 90%) + (5% x 20%)] = **$151,936.** Over 5 years and in present value 2009 dollars this would equal ***$685,999.***

2.5.4 The cost of life lost due to interaction of vegetation with electric lines under Options B and C

The value of statistical life (VSL) based on willingness to pay by individuals to prevent death is used in this section for *illustrative purposes only*. Willingness to pay values for life are usually derived via: wage-risk studies (revealed preferences); studies of consumer behavior; and stated preference surveys. Valuations that are based on the value of a statistical life using revealed preferences studies of individuals, are problematic in that a presumption is made that:

- workers understand risk-differentials;
- the model distinguishes between premiums for fatal and non-fatal accidents; and
- the results are not statistical artifacts of the way in which the model is specified.[258]

Willingness to pay derived from studies of household purchases is inferred from the purchase of safety devices or choices between safety and travel time, however there is the concern of the under or over perception of the true risks, as well as estimate of time values.[259] In relation to stated preference surveys there has been a concern regarding the dependency of answers on how questions are presented and the wider range of results than with the wage-risk method (itself problematic).[260]

Most importantly, the value of a statistical life (VSL) is flawed *in principle* (despite the measurement problems) because estimates fail to capture the 'true' value of a human life, that is, the value to not only the individuals themselves but the value of that life to relatives and friends. Without this consideration any valuation is in essence a minimum value. Therefore, the value of statistical life (VSL)[261] of $3.74 million[262] is considered to

[258] Abelson, P. (2008), *Public Economics: Principles and Practice*, 2nd Edition, McGraw Hill.
[259] Ibid, 2008
[260] Ibid, 2008
[261] Willingness to pay estimates range from $1.0m to $10.m however the most reliable results range between US$2m to US$5m - See Peter Abelson (2008)
[262] VSL suggested by the VCEC and based on guidance from the Commonwealth Office of Best Practice Regulation

be only a *weak* proxy for the estimation of the cost of deaths due to bush fires or electrocutions resulting from vegetation and electric lines interacting.

Futhermore, the number of lives lost is correlated to the proportion of hectares burnt as a proxy. This need for a proxy is due to data limitations in regards to the number of lives lost as a result of the interaction of vegetation with electric lines. The value of incremental benefits in terms of lives saved are attributable to this assumption which is a main driver. Based on Table A2.21, Options B and C are associated with 7%[263] of 193 deaths from bushfires = 13.51 deaths over 22 years or 0.61 deaths per annum. The value of life lost per year is estimated as 0.61 deaths per annum x *at least* $3.74 million = *at least* **$2,296,700 per annum**. The true value of lives lost would, of course, be greater than this.

Deaths caused by electrocutions due to the interaction of electric lines with vegetation in the State of Victoria are assumed to be only 1 a year. According to ESV it is concievable and highly likely that this could typically occur as there have been close calls and death has been avoided by chance. The value of life lost per year is therefore simply 1 death per annum x *at least* $3.74 million = *at least* **$3,740,000**. Over 5 years the value of lives (statistical life) being lost as a result of bushfires and electrocutions caused by the interaction of vegetation and electric lines is estimated to be ***$10,369,721*** and ***$16,886,296***, respectively, in 2009 present value dollars.

2.5.5 Benefit in terms of bushfire and electrocution related death resulting from the interaction of vegetation with electric lines avoided under Options B and C

In order to estimate the incremental benefit of Options B and C in terms of the value of lives saved over the 'base case' it is assumed that there is a reduction in the probability of the 193 bushfire deaths over 22 years under Options B and C occuring due to electric lines and vegetation by 1%. That is to say, electric lines and vegetation under the 'base case' are associated with 8% of 193 bushfire deaths = 15.44 deaths over 22 years or 0.70 deaths per annum.

Bushfires related deaths avoided

As shown in Table A2.25 the annual cost savings in terms of bushfire related deaths avoided, would be approximately **$0.33m** per annum. Over 5 years the incremental cost savings under Options B and C would be ***$1,481,389*** in 2009 dollars.

Table A2.25: Estimated annual value of life saved in relation to bushfires under Options B and C as compared to the base case

No. of bushfire related deaths under the base case/annum	**0.7**
Value of lives lost under the base case (no. of bushfire related deaths under the base case due to bushfires x $3.74m)	$2,624,800
Value of lives lost under Options B and C	$2,296,700
Total annual value of life saved under Options B and C	**$328,100**

[263] Proxy of proportion of deaths and/or injuries attributable to power lines based on 50% of the proportion of 14% of hectares burnt as a result of power lines (see ABS (2004) - Year Book Australia, Cat.No. 1301.0). This is very conservative view of the long run averages. In fact on Black Saturday there were 173 deaths alone of which a much higher proportion than 7% could be attributed to electricity assets – depending on the outcome of the Royal Commission.

Electrocution related deaths avoided

The number of lives lost by electrocutions under the base case is estimated to be 1.01 ((i.e. 1% more lives). As shown in Table A2.26, the annual value of lives saved by reducing electrocution would be equal to approximately **$0.04m** per annum. Over 5 years the incremental cost savings under Options B and C would be ***$168,863*** in 2009 dollars.

Table A2.26: Estimated annual value of life saved in relation to electrocutions under Options B and C as compared to the base case

No. of elecrocution related deaths under the base case /annum	**1.01**
Value of life lost under the base case (number of lives lost under the base case due to electrocutions x $3.74m)	$3,777,400
Value of life lost under Options B and C	$3,740,000
Total annual value of life saved under Options B and C	**$37,400**

2.5.6 Benefit in terms of bushfire and electrocution related death resulting from the interaction of vegetation with electric lines avoided under Options D, E and F

The incremental benefit of Options D, E and F is assumed to be larger than under B and C in terms of bushfire and electrocution deaths avoided, due to the omission of *existing clauses 9.2.1* and *9.2.2* and *11.2*. To estimate the incremental benefit of Options D, E and F against the 'base case' in relation to bushfire and electroctuion deaths avoided, the cost of bushfire and elecrocution related deaths under these options is established first.

Bushfires related deaths avoided

The additonal benefit of Options D, E and F over Options B and C is captured by assuming a reduction in the probability of the 193 bushfire deaths over 22 years due to electric lines and vegetation by 0.5% as compared to Options B and C (i.e. from 7% to 6.5%). That is to say, electric lines and vegetation under the Options D, E and F are associated with 6.5% of 193 bushfire deaths = 12.55 deaths over 22 years or 0.57 deaths per annum.

The value of life lost per year under Options D, E and F is estimated as 0.57 deaths per annum x *at least* $3.74 million = *at least* **$2,132,650** per annum. The true value of lives lost would, of course, be greater than this. As shown in Table A2.27, the annual cost savings in terms of bushfire related deaths avoided would be approximately **$0.49m** per annum. Over 5 years the incremental cost savings under Options D, E and F, would be ***$2,222,083*** in 2009 dollars.

Table A2.27: Estimated annual value of life saved in relation to bushfires under Options D, E and F as compared to the 'base case'

Value of lives lost under the base case (no. of bushfire related deaths under the base case due to bushfires x $3.74m) (see Table A2.25 for source of estimate)	**$2,624,800**
Value of lives lost under Options D, E and F	$2,132,650
Total annual value of life saved under Options D, E and F	**$492,150**

Electrocution related deaths avoided

Deaths caused by electrocutions due to the interaction of electric lines with vegetation in the State of Victoria are assumed to be only 99.5% of 1 life a year under Options D, E and F (i.e. 0.5% less than Options B and C). The value of life lost per year is therefore simply 0.995 deaths per annum x *at least* $3.74 million = *at least $3,721,300*. As shown in Table A2.28, the annual value of lives saved by reducing electrocution would be **$56,100** per annum. Over 5 years the incremental cost savings under Options D, E and F, would be ***$253,294*** in 2009 dollars.

Table A2.28: Estimated annual value of life saved in relation to electrocutions under Options D, E and F as compared to the base case

Value of life lost under the base case (number of lives lost under the base case due to electrocutions x $3.74m) (see Table A2.26 for source of estimate)	**$3,777,400**
Value of life lost under Options D, E and F	$3,721,300
Total annual value of life saved under Options D, E and F	**$56,100**

2.5.7 Benefit in terms of bushfire and electrocution related death resulting from the interaction of vegetation with electric lines avoided under Option A

The benefit (cost savings) of Option A over the 'base case' in terms of deaths avoided is estimated assuming a lower incremental benefit under Option A with no recommendation or requirements for management plans.

Bushfires related deaths avoided

The smaller additonal benefit of Option A is captured by assuming an increase in the probability of the 193 bushfire deaths over 22 years due to electric lines and vegetation by 0.75% as compared to Options B and C (i.e. from 7% to 7.75%). That is to say, electric lines and vegetation under the Options D, E and F are associated with 7.75% of 193 bushfire deaths = 14.96 deaths over 22 years or 0.68 deaths per annum.

The value of life lost per year is estimated as 0.68 deaths per annum x *at least* $3.74 million = *at least* **$2,542,775**. The true value of lives lost would, of course, be greater than this.

As shown in Table A2.29, the (unadjusted) annual cost savings in terms of bushfire related deaths avoided would be **$82,025** per annum.

Table A2.29: Estimated annual value of life saved in relation to bushfires under Option A as compared to the base case (unadjusted for adherence rates or source of benefit rates)

Value of lives lost under the base case (no. of bushfire related deaths under the base case due to bushfires x $3.74m) (see Table A2.25 for source of estimate)	$2,624,800
Value of lives lost under Option A	$2,542,775
Total (unadjusted) annual value of life saved under Option A	**$82,025**

The total unadjusted annual benefit of bushfire related deaths avoided under Option A in Table A2.29 is modified using weightings of rates of adherence and rates of source of benefits in Table A2.10. The total annual incremental value of bushfire related deaths avoided under Option A = $82,025 x [(95% x 90%) + (5% x 20%)] = **$70,952.** Over 5 years and in present value 2009 dollars this would equal ***$320,350.***

Electrocution related deaths avoided

Deaths caused by electrocutions due to the interaction of electric lines with vegetation in the State of Victoria are assumed to be only 1.0075% of 1 life a year under Option A (i.e. 0.75% more than Options B and C). The value of life lost per year is therefore simply 1.0075 deaths per annum x $3.74 million = **$3,768,050**.

As shown in Table A2.30, the (unadjusted) annual value of lives saved by reducing electrocution would be **$9,350** per annum under Option A.

Table A2.30: Estimated annual value of life saved in relation to electrocutions under Option A as compared to the base case (unadjusted for adherence rates or source of benefit rates)

Value of life lost under the base case (number of lives lost under the base case due to electrocutions x $3.74m) (see Table A2.26 for source of estimate)	$3,777,400
Value of life lost under Option A	$3,768,050
Total (unadjusted) annual value of life saved under Option A	$9,350

The total unadjusted annual benefit of electrocution related deaths avoided under Option A in Table A2.30 is modified using the weightings of rate of adherence and rates of source of benefits in Table A2.10. The total annual incremental value of electrocution related deaths avoided under Option A = $9,350 x [(50% x 90%) + (50% x 20%)] = **$5,143.** Over 5 years and in present value 2009 dollars this would equal ***$23,219.***

2.5.8 The cost of bushfire related injuries due to interaction of vegetation with electric lines under Options B and C

Injuries sustained due to electric shock arising from failed neutrals are minimal and there are roughly 200 per annum[264]. Such injuries do not require hospitalisation.

[264] Based on advice from ESV

On the other hand, injuries sustained due to bushfires are more substantive. According to the the Australian Institute of Criminology, more people are injured from bushfires than all other natural disasters[265]. The cost of injuries is estimated in the following way.

Firstly, Table A2.21 notes that there have been 1,456 injuries sustained over a period of 22 years (see Table A2.21 for source of estimate) or 66.18 injuries per annum. It is assumed that 7%[266] of bushfire related injuries are due to the interaction of vegetation with electric lines or **4.63** injuries per annum. Again, the number of lives injuries sustained is correlated to the proportion of hectares burnt as a proxy. This need for a proxy is due to data limitations in regards to the number of injuries sustained as a result of the interaction of vegetation with electric lines. The value of incremental benefits in terms of injuries avoided are attributable to this assumption, which is a main driver.

The rate of hospitalisation in Victoria of injuries caused by fires/flames and burns is given as 8.9%[267]. The average lifetime cost per injured person (where injuries are due to fires/flames and burns) is is given as $7,097[268]. The average cost of treating severe burns is given as $124,415 in 2009 dollars[269]. The weighted cost of injuries is therefore estimated as **$81,250** per annum:

4.63 persons injured x 8.9% x $124,415 + 4.63 persons injured x 91.1% x $7,097 = $81,250

The cost of bushfire related injuries under Options B and C due to bushfires over 5 years, is therefore estimated to be ***$366,849*** in 2009 dollars.

2.5.9 Benefit in terms of cost of injuries resulting from the interaction of vegetation with electric lines avoided under Options B and C

In order to estimate the incremental benefit of Options B and C in terms of bushfire relatd injuries avoided as compared to the 'base case', it is assumed that there is a reduction in the probability of the 1,456 bushfire injuries over 22 years under Options B and C occuring due to electric lines and vegetation by 1%. That is to say, electric lines and vegetation under the 'base case' are associated with 8% of 1,456 bushfire injuries = 116.48 injuries over 22 years or 5.29 injuries per annum. Table A2.31 shows that the annual cost savings in terms of injuries avoided would be **$11,607** per annum. Over 5 years the incremental cost savings under Options B and C would be ***$52,407*** in 2009 dollars.

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[265] Australian Institute of Criminology (AIC) 2004

[266] Proxy of proportion of deaths and/or injuries attributable to power lines based on 50% of the proportion of 14% of hectares burnt as a result of power lines (see ABS (2004) - Year Book Australia, Cat. No. 1301.0).

[267] Watson, W.L and Ozanne-Smith, J (1997)

[268] Estimate is based on 1993 figure of $4,741 (see Watson, W.L and Ozanne-Smith, J (1997)). Adjustment based on September 1993 Melbourne CPI index of 110.5 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No. 6401.0).

[269] Estimate is based on a 2006 figure of $115,614 in (see http://www.health.gov.au/internet/main/publishing.nsf/Content/E6CAF670D550F646CA25747700074A51/$File/Our%20patients.pdf). Adjustment based on a September 2006 Melbourne CPI index of 153.7 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No.6401.0)

Table A2.31: Incremental annual bushfire related injury costs saved under Options B and C as compared to the base case

No. of bushfire related injuries sustained under the base case/annum	**5.29**
Value of bushfire related injuries sustained under the base case (number of bushfire related injuries sustained under the base case 5.29 x 8.9%*$124,415 + 5.29*91.1%*$7,097)	$92,857
Value of bushfire related injuries sustained under Options B and C	$81,250
Total annual value of injury costs saved under Options B and C	**$11,607**

2.5.10 Benefit in terms of cost of bushfire related injuries resulting from the interaction of vegetation with electric lines avoided under Options D, E and F

The additional benefit of Options D, E and F, in terms of bushfire and electrocution deaths avoided, is assumed to be larger than under B and C due to the omission of *existing clauses 9.2.1* and *9.2.2* and *11.2*. To estimate the benefit of Options D, E and F against the 'base case' in relation to bushfire inujuries avoided, the cost of bushfire injuries under these options is established first. The additional benefit of Options D, E and F over Options B and C is captured by assuming a reduction in the probability of the 1,456 bushfire injuries over 22 years occuring due to electric lines and vegetation by 0.5% (i.e from 7% under Options B and C to 6.5% under Options D, E and F). That is to say, electric lines and vegetation under Options D, E and F are associated with 6.5% of 1,456 bushfire injuries = 94.64 injuries over 22 years or **4.3** injuries per annum.

Given that:

- The rate of hospitalisation in Victoria of injuries caused by fires/flames and burns is given as 8.9%[270];
- the average lifetime cost per injured person (where injuries are due to fires/flames and burns) is given as $7,097[271]; and
- the average cost of treating severe burns is given as $124,415 in 2009 dollars[272];

the cost of injuries is therefore estimated as **$75,447** per annum:

4.3 persons injured x 8.9% x $124,415 + 4.3 persons injured x 91.1% x $7,097 = $75,447

The cost of bushfire related injuries under Options D, E and F due to bushfires over 5 years, is therefore estimated to be ***$340,645*** in 2009 dollars.

[270]Watson, W.L and Ozanne-Smith, J (1997)

[271] Estimate is based on 1993 figure of $4,741 (see Watson, W.L and Ozanne-Smith, J (1997)). Adjustment based on September 1993 Melbourne CPI index of 110.5 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No.6401.0)

[272] Estimate is based on a 2006 figure of $115,614 in (see http://www.health.gov.au/internet/main/publishing.nsf/Content/E6CAF670D550F646CA25747700074A51/$File/Our%20patients.pdf). Adjustment based on a September 2006 Melbourne CPI index of 153.7 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No.6401.0)

As shown in Table A2.32, the annual incremental value of injuries avoided would be approximately **$0.02m** per annum. Over 5 years the incremental cost savings under Options D, E and F, would be ***$78,610*** in 2009 dollars.

Table A2.32: Incremental annual bushfire related injury costs saved under Options D, E adn F as compared to the base case

Value of bushfire related injuries sustained under the base case (number of bushfire related injuries sustained under the base case 5.29 injuries x 8.9%*$124,415 + 5.29 injuries 91.1%*$7,097) (see Table A2.31 for source of estimates)	**$92,857**
Value of bushfire related injuries sustained under Options D, E and F	$75,447
Total annual value of injury costs saved under Options D, E and F	**$17,411**

2.5.11 Benefit in terms of cost of bushfire related injuries resulting from the interaction of vegetation with electric lines avoided under Option A

The lower additonal benefit of Option A (due to lack of recommendation of, approvals and audits of management plans) is as compared to Options B and C is captured by assuming an increase in the probability of the 1,456 bushfire injuries over 22 years occuring due to electric lines and vegetation by 0.75% (i.e from 7% under Options B and C to 7.75% under Option A). That is to say, electric lines and vegetation under Option A is associated with 7.75% of 1,456 bushfire injuries = 112.84 injuries over 22 years or **5.13** injuries per annum.

Given that:

- The rate of hospitalisation in Victoria of injuries caused by fires/flames and burns is given as 8.9%[273];
- the average lifetime cost per injured person (where injuries are due to fires/flames and burns) is is given as $7,097[274]; and
- the average cost of treating severe burns is given as $124,415 in 2009 dollars[275];

the cost of injuries is therefore estimated as $89,956 per annum:

5.13 persons injured x 8.9% x $124,415 + 5.13 persons injured x 91.1% x $7,097 = $89,956

As shown in Table A2.33, the annual (unadjusted) value of injuries avoided under Option A would be **$2,902** per annum.

[273] Watson, W.L and Ozanne-Smith, J (1997)

[274] Estimate is based on 1993 figure of $4,741 (see Watson, W.L and Ozanne-Smith, J (1997)). Adjustment based on September 1993 Melbourne CPI index of 110.5 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No.6401.0)

[275] Estimate is based on a 2006 figure of $115,614 in (see http://www.health.gov.au/internet/main/publishing.nsf/Content/E6CAF670D550F646CA25747700074A51/$File/Our%20patients.pdf). Adjustment based on a September 2006 Melbourne CPI index of 153.7 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat. No.6401.0)

Table A2.33: Incremental annual bushfire related injury costs saved under Option A as compared to the 'base case' (unadjusted for adherence rates or source of benefit rates)

Value of bushfire related injuries sustained under the base case (number of bushfire related injuries sustained under the base case 5.29 injuries x 8.9%*$124,415 + 5.29 injuries 91.1%*$7,097) (see Table A2.31 for source of estimates)	$92,857
Value of bushfire related injuries sustained under Option A	$89,956
Total(unadjusted) annual value of injury costs saved under Option A	$2,902

The total unadjusted benefit of bushfire injuries avoided under Option A in Table A2.33 is modified using the weightings of rates of adherence and rates of source of benefits in Table A2.10. The total annual bushifre injury costs saved under Option A = $2,902 x [(95% x 90%) + (5% x 20%)] = $2,510**.** Over 5 years and in present value 2009 dollars this would equal ***$11,333***.

2.6 Value of conservation of significant flora and fauna under Options B and C

A few Victorian specific studies have tried to capture the value of conserving vegetation, as shown in Table A2.34.

Table A2.34: Victorian Conservation Willingness to Pay (WTP) Studies

Author	Site	Technique: CVM/CM	Measure	Estimate
Streeting and Hamilton (1991)[276]	National Estate Forests of southeast Australia	CVM	Preservation value of forests (non-use value) (60% of total economic value[277])	Value per person per annum = $13.10
Loomis et al (1993)[278]	Natural Estate forests of East Gippsland , Victoria,	CVM Dichotomous Choice and open ended	Use + Non-use benefit of protection	WTP of $52 per household per annum
Jakobbson, C. M and Dragun A.K (1996)	All of Victoria	CVM Discrete choice and open ended continuous	Willingness to pay for endangered flora and fauna in Victoria	Mean WTP of ***$117.85*** per person per annum

However the one most directly relevant for this RIS is the value of endangered flora and fauna to Victorians state wide as given by a 1996 study by Jakobbson and Dragun[279]. In their study, the average willingness to pay to conserve endangered flora and fauna throughout the state of Victoria was given to be $117.85 per person per annum. In 2009 dollars this would equal $162.54[280]. Assuming full employment and that the population of Victoria over 15 (working age) in 2009 is 4,927,171[281] the total estimated value of conservation of significant flora and fauna statewide is equal to *$800,852,982 per annum*. Over 5 years and in 2009 dollars this would be equal to **$3,615,893,161**.

Both the amount and variety of flora and fauna affected by electric lines is conceivably quite different than under this study which covers all species of flora and fauna right across the state. Whilst this value would be significantly lower if areas of Victorian ecosystems not affected by electric lines were excluded, the importance and priority of conservation of flora and fauna in areas affected for the community would still be significant.

It should be noted that electric lines provide important corridors for the movement of fauna between protected parks and sanctuaries. These corridors help to maintain the genetic diversity of species thereby helping to minimise the risk of extinction. The area

[276] Streeting, M., and Hamilton, C., (1991)
[277] Recreation value not included.
[278] Loomis, J, Lockwood, M, and Delacy, T., (1993)
[279] Jakobbson, C.M and Dragun A.K (1996)
[280] Adjustment based on a June 1996 Melbourne CPI index of 119.2 and a June 2009 index of 164.4 (See ABS (June 2009), Consumer Price Index, Cat.no. 6401.0).
[281] Based on population over 15 (i.e. 18.8% in June 2008 (see ABS (2008) *Population by Age and Sex, Regions of Australia*, Cat.no.3235.0)) and total population of Victoria as of September 2009 of 5,402,600 in March of 2009 (see ABS (Mar 2009) Australian Demographic Statistics, Cat.no. 3101.0).

of such a corridor is estimated in order to determine the proportion of the total annual value of conservation of significant flora and fauna statewide of $800,852,982 relevant to electric lines.

There are 200,000kms[282] of power line and 6,600kms[283] of transmission line in Victoria. A span of 20 metres is determined to be relevant by ESV in relation to corridors provided by power lines and a span of 60 metres is determined to be relevant for transmission lines. A corridor of 4 billion square metres of area for power lines (i.e. 4,000km^2) and 390 million square metres of area for transmission lines (i.e. 396km^2) is therefore established. The total of 4,396km^2 of electric line corridors is 1.93% of area for the State of Victoria[284] (i.e. 4,396km^2 = 1.93% of 227,416km^2). Therefore, electric lines and the corridores they provide are assumed to impact on *1.93% of the aforementioned total annual value of conservation* – and this is assumed to be worth ***$15,480,660***[285] ***per annum*** under Options B and C.

2.6.1 Benefit of conservation of significant flora and fauna provided under Options B and C

In order to estimate the incremental benefit of Options B and C in terms of conservation of significant flora and fauna, it is assumed as shown in Table A2.35, that vegetation surrounded by electric lines provides 5% more conservation value under Options B and C as compared to the 'base case'. In the absense of a prescribed code, vegetation clearing and removal activities would have a considerable impact on significant flora and fauna in Victoria.

Table A2.35: Estimated annual incremental conservation benefits provided under Options B and C

Value of conservation provided under the base case = 5% less than $15,480,660	**$14,743,485**
Value of conservation provided under Options B and C = 1.93% of the total annual value of conservation value of $800,852,982)	$15,480,660
Total annual value of incremental conservation benefits under Options B and C	**$737,174**

This annual incremental benefit in terms of conservation would be approximately **$0.74m** per annum. Over 5 years the incremental cost savings under Options B and C, would be ***$3,328,380*** in 2009 dollars.

2.6.2 Benefit of conservation of significant flora and fauna provided under Options D and F

Proposed clause 2(3) under Options D, E and F confers additional environmental benefits but does not result in the imposition of additional costs. Under other legislation concerning native vegetation, a person must obtain a permit before cutting particular

[282] http://www.dpi.vic.gov.au/DPI/dpinenergy.nsf/childdocs/-0C306F2F3028B653CA25729D00101051-25D26EC3CCDC0CF8CA2572B300162E22?open

[283] http://www.sp-ausnet.com.au/?id=22023012026C624F8D0B9B72DCA2575DE0036D105 and includes 100km for BassLink.

[284] ABS (2008), *Year Book Australia*, Cat. No. 1301.0

[285] 1.93% x $800,852,982 per annum = ***$15,480,660 per annum***

trees. Under this native vegetation legislation, there is a 'general exemption' from having to obtain permits on the basis that cutting is not excessive and that it is done in accordance with this code of practice (CoP). *Proposed clause 2(3)* requires a person to, as far as practicable, minimise cutting of particular vegetation. Practicable is a defined term under the Electricity Safety Act and includes consideration of both the magnitude of hazards and costs of dealing with those hazards. *Proposed clause 2(3)* therefore, allows a responsible person to come to a reasonable balance between the extent of cutting and the length of time between cutting cycles. Unlike the 'buffer zone' specified in SA legislation and considered under Option F, *proposed clause 2(3)* does not force a responsible person to change long established, reasonable cutting cycles. If, however, a responsible person cuts more than is required to achieve clearance from the power lines plus an appropriate allowance for regrowth before the next cutting cycle, the effect of *proposed clause 2(3)* is that the responsible person is in breach of the CoP. If the responsible person is in breach of the CoP, the exemption lapses on two counts, excessive cutting and non-compliance with the CoP. The consequence of this is that the responsible person is then in breach of the native vegetation legislation for cutting without a permit and hence is subject to the relevant penalties under the native vegetation legislation. *Proposed clause 2(3)* thus protects native trees from excessive cutting without imposing additional costs and effectively operates as a 'soft' buffer zone.

In order to calculate the higher incremental benefits of Options D and F in relation to Options B and C, the value of conservation under Options D and F is set at 5% higher than under Options B and C (i.e. 5% more than the $15,480,660). Hence the value of conservation is assumed to be worth *$16,254,693 per annum* under Options D and F. Whilst Options B and C provide for general notification, as compared to the base case, *proposed clause 2(3)* under Option D and F is more targeted to conservation. This implies that Options D and F would provide 10.25% more conservation value than the 'base case'.

As shown in Table A2.36, the annual incremental benefit in terms of conservation would be approximately **$1.51m** per annum as compared to the 'base case'. Over 5 years the incremental cost savings under Options D and F would be approximately ***$6,823,180*** in 2009 dollars.

Table A2.36: Estimated annual incremental conservation benefits provided under Options D and F as compared to the base case

Value of conservation provided under the base case (see Table A2.35 for source of estimate)	**$14,743,485**
Value of conservation provided under Options D and F (5% more conservation value than the $15,480,660 per annum value of Option B and C)	$16,254,693
Total annual value of incremental conservation benefits under Options D and F	**$1,511,207**

2.6.3 Benefit of conservation of significant flora and fauna provided under Option A

In order to calculate the minimal incremental benefit of Option A, as compared to Options B C, D, and F, the incremental value of conservation is set as 4% lower than under Options B and C (i.e. 4% less than $15,480,660). Hence the value of conservation is assumed to be worth *$14,885,250 per annum* under Option A. This reflects the smaller impact that Option A would have on conservation to the extent that there would be no prescribed management plans, approvals of complex plans, or audits. Also notification and consultation and proposed clause 2(3) would only be 'recommended'. As shown in Table A2.37, the annual unadjusted benefit in terms of conservation would be $924,061 per annum as compared to the base case.

Table A2.37: Estimated annual incremental conservation benefits provided under Option A as compared to the 'base case' (unadjusted for adherence rates or source of benefit rates)

Value of conservation provided under the base case (see Table A2.35 for source of estimate)	**$14,743,485**
Value of conservation provided under Option A (4% less conservation value than the $15,480,660 per annum value of Option B and C)	$14,885,250
Total unadjusted annual value of incremental conservation benefits under Option A	**$141,764**

The total adjusted value of conservation provided under Option A in Table A2.38 is modified using the weightings of rates of adherence and rates of source of benefits in Table A2.10. The total annual value of conservation under Option A adjusted would be equal to $141,764 x [(95% x 90%) + (5% x 20%)] = **$122,626.** This implies that Option A would annually provide 0.83% more conservation value than the 'base case':

adjusted benefit of $122,626 /$14,743,485 x 100 = 0.83%

Over 5 years and in present value 2009 dollars this would equal ***$553,663***.

2.6.4 Benefit of conservation of significant flora and fauna provided under Option E

Under Option E *proposed clause 2(3)* would continue to provide a 'soft buffer' against excessive cutting and removal as with Option D and F and would prescribe management plans, approvals of complex plans and audits and in this sense would continue to provide conservation benefits. However, without *proposed clause 5*, responsible persons would not be required to notify and consult with occupiers, owners and affected persons before undertaking pruning or clearing. The removal of notification requirement would have more impacts on vegetation of significance. Information held by affected persons regarding the significance of vegetation would go unnoticed by responsible persons resulting in excessive cutting or removal. Therefore, some of the potential incremental benefit is lost. However, it is assumed that the incremental benefit of Option E lost due to lack of notification and consultation is slightly offset by the benefit arising from *proposed clause 2(3).*

In order to calculate the lower incremental benefit of Option E, in relation to Options D and F, the value of conservation under Option E is set only slightly higher than under Options B and C (i.e. 0.5% more than $15,480,660). Hence the annual value of conservation is assumed to be worth *$15,558,063 per annum* under Option E. This implies that Option E would provide betwen 5.52% more conservation value than the 'base case'. As shown in Table A2.38, the annual incremental benefit in terms of conservation would be approximately **$0.81m** per annum as compared to the 'base case'. Over 5 years the cost savings under Option E would be ***$3,677,860*** in 2009 dollars.

Table A2.38: Estimated annual incremental conservation benefits provided under Option E as compared to the base case

Value of conservation provided under the base case (see Table A2.35 for source of estimate)	**$14,743,485**
Value of conservation provided under Options D and F (0.5% more conservation value than the $15,480,660 per annum value of Option B and C)	$15,558,063
Total annual value of incremental conservation benefits under Options D and F	**$814,578**

Appendix 3 – Incremental Quantifiable Costs of Options A, B, C, D, E & F

The purpose of Appendix 3 is to establish the main quantifiable costs of the options in relation to management plans; notification costs and dispute resolution procedures for responsible persons; and audit costs to ESV; omission of *existng clauses 9.2.1*, *9.2.2* (relating to small branch and vegetation) and *11.2* (relating to overhanging vegetation); additional duties of local councils, the Roads Corporation and others (*proposed clause 7*); Management procedures to minimise danger for distribution businesses (*proposed clause 8*); notification of land owners, occupiers and affected persons where urgent cutting and removal is required (*proposed clause 6*); delays under *existing clause 3*; the creation of a buffer zone under Option F; and loss of private use value of properties under Option E. Having the requirement of no cutting beyond the clearance space of 1metre where urgent cutting or removal is needed (*proposed clause 6*) does not impose a cost on responsible persons. This is because *proposed clause 6* does not change cutting cycles and any more/less need for urgent cutting or removal is brought about by 'voluntary' neglect/attention by the responsible person to begin with.

To avoid rounding error, the dollar amounts used in the calculations of this Appendix have not been rounded. However, the resulting total amounts used in the body of the RIS have been rounded to the nearest single decimal place.

3.1 Estimated incremental costs of management plans (reg.9)

The costs of developing and updating management plans are estimated using the number of responsible persons (except land occupiers) by category as shown in Table A3.1. Furthermore, the typical costs associated with developing and updating management plans are divided into three broad categories of responsible persons including: transmission businesses; distribution businesses; and other responsible persons under Sec.84 of the Act. Finally, according to ESV it is expected that approximately four new 'responsible persons' (namely wind farms) will need to develop initial management plans to be updated annually.

Table A3.1: Category and number of responsible persons needing to develop and/or update management plans in 2009/10[286]

Category of responsible person	Number of Responsible persons
Transmission Businesses	**2**
SP Powernet Pty Ltd Basslink	
Distribution Businesses	**6**
Jemena NE SPI Electricity Pty Ltd Citipower Powercor + Powercor (Docklands) United Energy Distribution (UED) Country Energy	
Other responsible persons under Sec.84 of the Act	**104**

[286] Details provided by ESV.

Category of responsible person	Number of Responsible persons
70 councils	
Melbourne Water	
Vic Roads	
Yarra Trams	
MainCo	
Parks Victoria	
Melbourne airport	
Bendigo Trams	
Tramway Museum Society of Victoria	
Ballarat tramway Museum	
Falls Creek Alpine Resort Management Board	
Mt Buller Mt Stirling Alpine Resort Management Board	
Perseverance Corporation Limited	
22 Wind farms	
Total	***112***

The number of management plans to be developed and updated per annum between 2010/11 and 2014/15 is given in Table A3.2 and is used as the population basis in order to estimate the costs of management plan requirements under the various options.

Table A3.2: Number of management plans that will need to be developed and/or updated between 2010/11 to 2014/15 by category

Category of responsible person	Number of management plans									
	2010/11		2011/12		2012/13		2013/14		2014/15	
	Develop (a)	Update (b)	Develop (c)	Update (d)	Develop (e)	Update (f)	Develop (g)	Update (h)	Develop (i)	Update (j)
Transmission businesses	N/A	2	N/A	2	N/A	2	N/A	2	N/A	2
Distribution businesses	N/A	6	N/A	6	N/A	6	N/A	6	N/A	6
Other responsible persons under Sec.84 of the Act	4	104	4	108	4	112	4	116	4	120

3.1.1 Cost of developing and updating management plans under Options C, D, E and F

The typical annual costs of developing and updating management plans (MPs) under Options D, E and F (the proposed regulation options) are shown in Table A3.3. Importantly, the cost of developing and updating MPs for responsible persons, apart from transmission and distribution businesses is taken as being equivalent to work undertaken by the average council[287]. The costs for developing an MP for a council are based on:

- an average of 82.81hrs[288] work;
- the salary cost of $34/hr (an arborist);
- the on-cost multiplier (i.e. 1.165135) covering salary related cost such as superannuation, payroll tax and leave entitlements[289]; and

[287] Advice given by ESV

[288] Arithmetic mean value of hours based on consultation with 4 separate councils and times provided of: 40hrs; 30hrs; 131.25hrs; and 130hrs.

[289] Victorian Competition and Efficiency Commission 2006, *(Draft) Guidance Note: Suggested default methodology and values for staff time in BIA/RIS analysis*, October.

- the overhead cost multiplier (i.e. 1.5136) covering indirect costs such as IT, accommodation, computers and vehicle expenses.

The formula given to calculate the hourly cost of preparing new management plans in 2010/11 is given as:

Hourly cost = ($34 x 1.165135 x 1.5136) = $59.42

Based on an average of 82.81hrs of work, the average cost of **preparing a new management plan** by a responsible person other than a distribution or transmission business is given as **$4,920.87**. Based on an average of 22.38hrs of work, the average cost of **updating a management plan** by a responsible person other than a distribution or transmission business is given as 22.48hrs x $59.42 = **$1,329.56.**

Table A3.3: Cost of developing and updating a management plan (MP) by category of responsible persons – Options C, D, E and F

Category of responsible person	Cost of developing an MP (k)	Cost of updating an MP (l)
Transmission businesses	$60,000[290]	$20,000[291]
Distribution businesses	$50,000[292]	$11,000[293]
Other responsible persons under Sec.84 of the Act	$4,920.87	$1,329.56

The product of 1) the cost of developing and updating management plans in Table A3.3 and 2) the number of management plans that need to be developed and updated in Table A3.2 are used to calculate the cost of management plans for each of the three categories of responsible persons. The management plan development cost formula for the relevant responsible person category in 2010/11, for example, becomes simply:

$$(a) \times (k)$$

Where:

(a) = the number of management plans that need to be developed for the relevant category of responsible person in 2010/11 taken from Table A3.2; and
(k) = the cost of development for the relevant category of responsible person taken from Table A3.3.

The management plan update cost formula for the relevant responsible person category becomes simply:

$$(b) \times (l)$$

Where:

[290] Figure provided by SP AusNet and this provides an estimated 583.24 hrs of work at an hourly charge out rate of $102.87 (hourly charge out rate based on the formula ($97,532.50/(44*38))*1.165135*1.5136) where $97,532.50 is the annual salary for a senior engineer (see ABS (August 2008) Employee Earnings and Hours, Australia Cat. no. 6306.0).
[291] Figure provided by SP AusNet and this provides an estimated 194.41 hrs of work at an hourly charge out rate of $102.87.
[292] Figure provided by Powercor and this provides an estimated 486.04 hrs of work at an hourly charge out rate of $102.87.
[293] Figure provided by Powercor and this provides an estimated 106.93 hrs of work at an hourly charge out rate of $102.87.

(b) = the number of management plans that need to be updated for the relevant category of responsible person in 2010/11 taken from Table A3.2; and
(k) = the cost of updating for the relevant category of responsible person taken from Table A3.3.

Repeating this exercise for each of the five years, as shown in Table A3.4, the 5-year present value cost of developing and updating management plans under Options C, D, E and F is estimated to be ***$88,872*** and ***$1,149,286***, respectively.

Table A3.4: Annual and 5-year costs of developing and updating management plans (MPs)[294] - Options C, D, E and F

Category of responsible person	Cost of management plans									
	2010/11		2011/12		2012/13		2013/14		2014/15	
	Develop (a)*(k)	Update (b)*(l)	Develop (c)*(k)	Update (d)*(l)	Develop (e)*(k)	Update (f)*(l)	Develop (g)*(k)	Update (h)*(l)	Develop (i)*(k)	Update (j)*(l)
Transmission businesses	0	$40,000	0	$40,000	0	$40,000	0	$40,000	0	$40,000
Distribution businesses	0	$66,000	0	$66,000	0	$66,000	0	$66,000	0	$66,000
Other responsible persons under Sec.84 of the Act	$19,684	$138,275	$19,684	$143,593	$19,684	$148,911	$19,684	$154,230	$19,684	$159,548
Total	$19,684	$244,275	$19,684	$249,593	$19,684	$254,911	$19,684	$260,230	$19,684	$265,548
Total PV	**$19,018**	**$236,014**	**$18,375**	**$232,998**	**$17,753**	**$229,915**	**$17,153**	**$226,775**	**$16,573**	**$223,584**
Total 5-year PV for developing management plans										***$88,872***
Total 5-year PV for updating management plans										***$1,149,286***

Table A3.5 below summarises the 5 year present value cost for each of the categories of responsible persons under Options C, D, E and F.

Table A3.5: Annual and 5-year costs of developing and updating management plans (MPs) by category of responsible persons[295] - Options C, D, E and F

Category of responsible person	5 year PV Cost of developing management plans	5 year PV Cost of updating management plans
Transmission businesses	$0	$180,602
Distribution businesses	$0	$297,993
Other responsible persons under Sec.84 of the Act	$88,872	$670,691
5-year PV total cost for all responsible persons	***$88,872***	***$1,149,286***

3.1.2 Cost of developing and updating management plans under Option B

The cost of management plans under Option B presumes additional work as required by additional information items under *existing regulation 9*. The estimate of costs assumes 10% more work (i.e. hrs) in preparing new and updating existing management plans, reflecting the more prescriptive nature of this option. Namely, the following main

[294] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.
[295] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.

compulsory requirements are added to management plans under *existing regulation 9* under Option B as compared with *proposed regulation 9*, under Options C, D and E:

- the long term strategies to minimize the risk of fires or electrocution from electric lines, the risk of safe operation of electric lines due to encroachment of vegetation and adverse affects of electric lines on surrounding vegetation.
- the alternative methods that may be adopted for maintaining the clearance space required by the Code of Practice between electric lines and vegetation if a person objects to the methods proposed by the responsible person and details of how the alternative methods are to be implemented;
- the length of the period between each pruning or clearing of vegetation;
- details of the technical standards that the responsible person will apply or have regard to in connection with electric line clearance work;
- the management procedures to be adopted by the responsible person to ensure compliance with the Code of Practice, which must include details of actions used to:
  - identify locations of pruning and clearing and conditions for urgent pruning and clearing;
  - calculate dimensions of space beyond clearance space required by Code of Practice;
  - monitor conditions in the area beyond the regrowth space;
  - calculate the length of the period required between each pruning or clearing of vegetation; and
  - ensure that urgent pruning or clearing to maintain the clearance space between each clearing or pruning time specified in the plan should not be required.

The cost per management plan (new and updated) used for cost estimations under this option are calculated using an adjustment of 10% additional time as shown in Table A3.6.

Table A3.6: Cost involved in developing and updating a management plan (MP) by category of responsible persons – Option B

Category of responsible person	Cost of developing an MP (m)	Cost of updating an MP (n)
Transmission businesses	$66,000[296]	$22,000[297]
Distribution businesses	$55,000[298]	$12,100[299]
Other responsible persons under Sec.84 of the Act	$5,412.96[300]	$1,462.52[301]

The product of 1) the cost of developing and updating management plans in Table A3.6 and 2) the number of management plans that need to be developed and updated in Table A3.2 are used to calculate the cost of management plans for each of the three categories of responsible persons for Option B. The management plan development cost formula for the relevant responsible person category in 2010/11, for example, becomes simply:

$$(a) \times (m)$$

Where:

(a) = the number of management plans that need to be developed for the relevant category of responsible person in 2010/11 taken from Table A3.2; and

[296] Based on an estimated 583.24 hrs of work + 10% more time at an hourly charge out rate of $102.87 (hourly charge out rate based on the formula ($97,532.50/(44*38))*1.165135*1.5136) where $97,532.50 is the estimated annual salary for a senior engineer in August 2009 (incremented by 4.48% per annum and taken from ABS (August 2008), *Employee Earnings and Hours, Australia*, Cat. no. 6306.0)
[297] Based on an estimated 194.41 hrs of work +10% more time at an hourly charge out rate of $102.87.
[298] Based on an estimated 486.04 hrs of work + 10% more time at an hourly charge out rate of $102.87.
[299] Based on an estimated 106.93 hrs of work + 10% more time at an hourly charge out rate of $102.87.
[300] Based on an estimated 82.81 hrs of work + 10% more time at an hourly charge out rate of $59.42.
[301] Based on an estimated 22.48 hrs of work + 10% more time at an hourly charge out rate of $59.42.

(m) = the cost of development for the relevant category of responsible person taken from Table A3.6.

The management plan update cost formula for the relevant responsible person category becomes simply:

$$(b) \times (n)$$

Where:

(b) = the number of management plans that need to be updated for the relevant category of responsible person in 2010/11 taken from Table A3.2; and
(m) = the cost of updating for the relevant category of responsible person taken from Table A3.6.

As shown in Table A3.7, the 5-year present value cost of developing new and updating existing management plans under Option B is estimated to be ***$97,759*** and ***$1,264,215***, respectively.

Table A3.7: Annual and 5-year costs of developing and updating management plans (MPs)[302] - Option B

Category of responsible person	Cost of management plans									
	2010/11		2011/12		2012/13		2013/14		2014/15	
	Develop (a)*(m)	Update (b)*(n)	Develop (c)*(m)	Update (d)*(n)	Develop (e)*(m)	Update (f)*(n)	Develop (g)*(m)	Update (h)*(n)	Develop (i)*(m)	Update (j)*(n)
Transmission businesses	0	$44,000	0	$44,000	0	$44,000	0	$44,000	0	$44,000
Distribution businesses	0	$72,600	0	$72,600	0	$72,600	0	$72,600	0	$72,600
Other responsible persons under Sec.84 of the Act	$21,652	$152,102	$21,652	$157,952	$21,652	$163,802	$21,652	$169,652	$21,652	$175,503
Total	$21,652	$268,702	$21,652	$274,552	$21,652	$280,402	$21,652	$286,252	$21,652	$292,103
Total PV	**$20,920**	**$259,616**	**$20,212**	**$256,297**	**$19,529**	**$252,907**	**$18,868**	**$249,452**	**$18,230**	**$245,942**
Total 5-year PV for developing management plans										***$97,759***
Total 5-year PV for updating management plans										***$1,264,215***

Table A3.8 below summarises the 5 year present value cost for each of the categories of responsible persons.

Table A3.8: Annual and 5-year costs of developing and updating management plans (MPs) by category of responsible persons[303] - Option B

Category of responsible person	5 year PV Cost of developing management plans	5 year PV Cost of updating management plans
Transmission businesses	$0	$198,662
Distribution businesses	$0	$327,793
Other responsible persons under Sec.84 of the Act	$97,759	$737,760
5-year PV total cost for all responsible persons	***$97,759***	***$1,264,215***

[302] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.
[303] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.

3.1.3 Cost of developing and updating management plans under Option A

Under Option A, adherence to the *proposed code* is voluntary. Whilst Option A would recommend the proposed code only, it is noted by ESV that major electric companies would still maintain and update a management plan for their own risk management requirements, as well as, meeting insurance, shareholder and customer expectations. It is assumed also that there would be some adherence in the voluntary development and updating of management plans by other responsible persons under sec.84 of the Act – but not to the same degree. Part 3.1.2 calculates the cost of management plans of Option A by assuming that the rate of adherence for major electricity companies and other responsible persons under sec.84 of the Act is 90% and 20%, respectively (See Part 2.7.1 of Appendix 2 for discussion).

Given these rates of adherence, the costs of developing and updating management plans are estimated by taking the values in Table A3.5 (for Options C, D, E and F) and multiplying them with the rates of adherence of 90% for major electric companies and 20% for other responsible persons under sec.84 of Act – as shown in Table A3.8(A). The annual cost for all transmission businesses and distribution businesses for developing management plans is $0 and the annual cost for all other responsible persons for developing management plans in 2010/11 is given as 20% x $21,652[304] or **$3,937.**

The annual cost for all transmission businesses in 2010/11 for updating management plans is given as 90% x $40,000[305] or *$36,000*. The annual cost for all distribution businesses in 2010/11 is given as 90% x $66,000[306] or *$59,400*. The annual cost for all other responsible persons under sec.84 of the Act is given as 20% x $138,275[307] or *$27,655*. The total annual cost in 2010/11 is given as **$123,055**.

Table A3.8A: Annual and 5-year costs of developing and updating management plans (MPs) by category of responsible persons[308] - Option A

Category of responsible person	5 year PV Cost of developing management plans	5 year PV Cost of updating management plans
Transmission businesses	$0	$162,542
Distribution businesses	$0	$268,194
Other responsible persons under Sec.84 of the Act	$17,774	$134,138
5-year PV total cost for all responsible persons	***$17,774***	***$564,874***

3.2 Estimated incremental costs of providing notification and consultation

Notification of affected persons by responsible persons in relation to cutting or removal of vegetation is estimated to have a considerable quantifiable cost impact[309]. Notification would typically be undertaken in writing or by publication in a local newspaper.

[304] See first column of Table A3.4 for source of estimate
[305] See second column of Table A3.4 for source of estimate
[306] See second column of Table A3.4 for source of estimate
[307] See second column of Table A3.4 for source of estimate
[308] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.

3.2.1 Costs of seeking permission or providing written notification under Options B, C (existing clause. 3)

Under exisiting *clause.3* a responsible person is required to seek permission from the occupier of land on which the vegetation is to be pruned or in the case of clearing, the owner and occupier of the land on which the vegetation is to be cleared and any affected person *or* give at least 14 days written notice of pruning or clearing to the relevant persons. As part of the permission seeking process it is assumed that there are, at times, some negotiations between responsible persons and occupiers/owners of private land/affected persons about a variety of issues (including: the type of clearing; when it will occur; special trees; access to property etc). This is intuitive in many examples of where permission is required. ESV has no empirical data in relation to the number, duration or frequency of these negotiations. It is possible that negotiations occur each year with some land owners. An example of a negotiation might be that a landowner does not want to allow access to their property however the firm can only comply with the regulations by accessing their land to allow physical access to the trees and to do so in a safe manner. These negotiations can be an important aspect of obtaining permission as land owners of even small parcels of land can hold up major works or cause re-visits. This is particularly the case where the land is in remote areas or fire prone areas.

If and only if, after taking reasonable steps the responsible person is unable to give written notice the responsible person must give 21 days notice of pruning or clearing in a newspaper circulating generally in the locality of the land on which the vegetation is to be pruned. The 'typical' cost of seeking permission or notification in writing or by publication in a newspaper (only as a last resort), by category of responsible person under Options B and C , is given in Table A3.9. Again, apart from transmission and distribution businesses, the annual cost to other responsible persons under Sec.84 of the Act is taken to be similar to that incurred by a council.

There was a substantial difference between SPI Electricity Pty Ltd's and Powercor's figures, which were $450,000 and $4,500,000 per annum respectively, and ESV queried the composition/methodology of Powercor's considerably higher number. ESV decided to take a conservative approach for the purposes of the RIS and to adopt the SPI Electricty Pty Ltd number as the base for estimating notification costs across the other distribution companies. That is to say, the SPI Electricity Pty Ltd figure of $450,000 is estimated *pro rata* across the other electricity distribution companies by using estimates for the number of overhead service lines (see Table A3.15) (column (p)); the proportion of overhead lines surrounded by vegetation (column (q)) – in the following formula:

> Cost of notification to a distribution company = $450,000 (i.e. the cost of notification for Powercor) x the number of overhead service lines for the relevant distribution company x proportion of overhead lines surrounded by vegetation for the relevant distribution company) / the number of overhead service lines for Powercor x the proportion of overhead lines surrounded by vegetation for Powercor).

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[309] This cost was not estimated as part of the Electrical Safety (Electric Line Clearance) Regulations 2005 RIS, however its potential magnitude necessitates an estimation.

Table A3.9: Estimated annual cost of seeking permission or providing writtent notification to affected persons by category of responsible persons – Options B and C (*existing clause.3*)

Category of responsible person	Annual cost for each category (o)
Cost of Notification or seeking permission for transmission companies	
Transmission companies:	
SP AusNet	$63,587
BassLink	$978
Total estimated annual cost for transmission companies	**$64,565**
Cost of Notification or seeking permission for distribution companies	
Distribution companies:	
Powercor	$4,500,000[310]
CitiPower	$450,000[311]
Jemena	$349,138[312]
United Energy	$657,645[313]
Country Energy	$226[314]
SPI Electricity Pty Ltd	$450,000[315]
Total estimated annual cost for all distribution companies	**$6,407,009**
Cost of Notification or seeking permssion for other responsible persons under sec.84 of the Act	
Total estimated annual cost per responsible persons under Sec.84 of the Act	**$8,890[316]**

The notification cost to Jemena of $349,138 per annum, for example, is estimated as $450,000 x 180,000 (number of overhead service lines for Jemena) x 70% (% of lines surrounded by vegetation for Jemena) – divided by 406,000 (number of overhead service lines for SPI Electricity Pty Ltd) x 40% (% of lines surrounded by vegetation for SPI Electricity Pty Ltd) = $349,138[317]:

$$Jemena = \$450{,}000 \times \frac{180{,}000 \times 70\%}{406{,}000 \times 40\%} = \$349{,}138$$

The estimated annual cost of notification of **$63,587** for SP AusNet in Table A3.9 is based on the product of the estimated *pro rata* cost of distribution notification of $450,000 for SP AusNet and the ratio of kms of transmission line for SP AusNet to kms of distribution line for SPI Electricty Pty Ltd:

[310] Estimated annual cost provided by Powercor.
[311] Estimated annual cost provided by Powercor on behalf of CitiPower (10% of the Powercor figure)
[312] $450,000 x 180,000 (overhead service lines for Jemena) x 70% (% surrounded by vegetation for Jemena) ÷ 406,000 (overhead service lines for SPI Electricity Pty Ltd) x 40% (% surrounded by vegetation for SPI Electricity Pty Ltd).
[313] $450,000 x 395,561 (overhead service lines for United Energy) x 60% (% surrounded by vegetation for United Energy) ÷ 406,000 (overhead service lines for SPI Electricity Pty Ltd) x 40% (% surrounded by vegetation for SPI Electricity Pty Ltd).
[314] $450,000 x 204 (overhead service lines for Country Energy) x 40% (% surrounded by vegetation for Country Energy) ÷ 340,000 (overhead service lines for SPI Electricity Pty Ltd) x 40% (% surrounded by vegetation for SPI Electricity Pty Ltd).
[315] Estimated annual cost provided by SP AusNet.
[316] Average of 5.6hrs and 8hrs a week as reported by two councils (i.e. 6.8hrs x 22 weeks x $59.42 = $8,889.51) and is rounded for presentation purposes.
[317] See Table A3.15 for source of estimates for number of overhead lines (column (p)) and % of lines surrounded by vegetation (column (q)).

$450,000 x length of electric line km for transmission (6,500km[318]) ÷ length of electric line km for distribution (46,000km[319]) = $63,587

The estimated annual cost of notifaction of **$978** for BassLink in Table A3.9 is based on the product of the estimated *pro rata* cost of transmission notification of $63,587 for SP AusNet and the ratio of kms of transmission line for Basslink to kms of trnamission line for SP AusNet:

$63,587 x length of electric line km for transmission for BassLink (100km[320]) ÷ length of electric line km for transmission for SP AusNet (6,500km[321]) = $978

The product of 1) the cost of notification in Table A3.9 and 2) the number of management plans that need to be updated (i.e. total number of responsible persons) in Table A3.2 (except for transmission businesses where the cost is simply the sum of $63,587 and $978) are used to calculate the cost of notification for each of the three categories of responsible persons for Options B and C. The notification cost formula for the relevant responsible person category in 2010/11, for example, becomes:

$$(b) \times (o)$$

Where:

(b) = the number of management plans that need to be updated for the relevant category of responsible person in 2010/11 taken from Table A3.2 (used as an indication of the number of responsible persons); and

(o) = the cost of notification for the relevant category of responsible person taken from Table A3.9.

Again given that 4 additional wind farm businesses (other responsible persons under sec.84 of the Act) will be affected each year over the 5 years, the estimated cost of notification is given as approximately ***$33.7m*** over 5 years in present value dollars as shown in Table A3.10.

Table A3.10: Annual and 5-year costs of seeking permission *or* providing notification of intended cutting or removal of vegetation[322] - Options B and C (*existing clause.3*)

Category of responsible person	2010/11	2011/12	2012/13	2013/14	2014/15
	(b)*(o)	(d)*(o)	(f)*(o)	(h)*(o)	(j)*(o)
Transmission company	$64,565	$64,565	$64,565	$64,565	$64,565
Distribution companies	$6,407,009	$6,407,009	$6,407,009	$6,407,009	$6,407,009
Other responsible persons under Sec.84 of the Act	$924,509	$960,068	$995,626	$1,031,184	$1,066,742
Total	$7,396,083	$7,431,641	$7,467,199	$7,502,757	$7,538,315
Total PV	**$7,145,974**	**$6,937,517**	**$6,734,986**	**$6,538,220**	**$6,347,059**
Total 5-year PV of costs of notification of affected persons of intended cutting or removal					***$33,703,756***

[318] http://www.sp-ausnet.com.au/?id=22023012026C624F8D0B9B72DCA2575DE0036D105
[319] http://www.sp-ausnet.com.au/?id=22023012026C624F8D0B9B72DCA2575DE0036D105
[320] Given by ESV
[321] http://www.sp-ausnet.com.au/?id=22023012026C624F8D0B9B72DCA2575DE0036D105
[322] All estimates are presented in whole numbers for presentation purposes and are subject to rounding error.

Table A3.11 below summarises the 5 year present value cost for each of the categories of responsible persons.

Table A3.11: Annual and 5-year costs of seeking permission or providing notification of intended cutting or removal of vegetation by category of responsible persons - Options B and C

Category of responsible person	5 year PV Cost of notification
Transmission business	$291,515
Distribution businesses	$28,927,979
Other responsible persons under Sec.84 of the Act	$4,484,261
5-year PV total cost for all responsible persons	***$33,703,756***

3.2.2 Costs of providing notification under Options D and F (proposed clause.5)

Under *proposed clause.5* notice must be given by responsible persons to all affected persons at least 14 days and not more than 60 days before the intended cutting or removal is to occur; and in writing *or* by publication in a newspaper circulating generally in the locality of the land in which the tree is to be cut or removed. Therefore Options D and F would provide a much more *cost effective* way of notifying affected persons – that is, by newspaper.

The 'typical' cost of notification by publication in a newspaper, by category of responsible person under Options D and F, is given in Table A3.12. In order to cost the proposed clause, responsible persons are divided up into three situational categories A, B and C.

Under ***category A*** type situation, a responsible person cutting right through year, would need a minimum of 365.25 ÷ (60 – 14) = 7.94 notices or, in other words, would need 8 notices per annum. These responsible persons would typically be a council with a large area (60 councils) a distribution business with a small area (CitiPower and Country Energy), or an organisation like VicRoads. It could also be a distribution business with a big area progressively running in one region at a time. It could also be a transmitter progressively running one region at a time (SP AusNet).

For a ***category B*** type situation, responsible persons (e.g. small councils or wind farms or transmission company with only a small proportion of electric line above ground (i.e. BassLink) would only need to cut once annually over a period of six weeks or less and would only need 1 notice only.

For a ***category C*** type situation, responsible persons (e.g. 4 large distribution businesses not including CitiPower and Country Energy), there would be a big cutting area with an average of 2 or 3[323] simultaneous areas being cut. Given that 8 notices would be required per cutting area – this would mean an average of 18 notices per annum are required.

[323] On advice of ESV.

The cost of a notice in a local newspaper (1 eighth page) is given as $518.20[324].

Given the category of notice situations A, B and C (i.e. the number of notices required under each) and the average cost of a notice (i.e. $518.20) the total cost of notices per cateogry of responsible persons is given in Table A3.12. The total cost in 2010/11 would be **$343,567**[325].

Table A3.12: Estimated annual cost of notification of affected persons (by newspaper) by category of responsible persons – Options D and F (*proposed clause.5*)

Category of responsible person	Number notices required per annum	**Annual cost for each category** (o2) = Number of notices required per annum x $518.20
Cost of notification for transmission companies		
SP AusNet @ 8 notices per annum (Category A)	8	$4,146
BassLink @ 1 notice per annum (Category B)	1	$518
Total estimated annual cost for transmission companies	**9**	**$4,664**
Cost of notification for distribution companies		
Powercor @ 18 notices per annum(Category C)	18	$9,328
CitiPower @ 8 notices per annum (Category A)	8	$4,146
Jemena @ 18 notices per annum(Category C)	18	$9,328
United Energy @ 18 notices per annum (Category C)	18	$9,328
Country Energy @ 8 notices per annum (Category A)	8	$4,146
SPI Electricity Pty Ltd @ 18 notices per annum (Category C)	18	$9,328
Total estimated annual cost for all distribution companies	**88**	**$45,602**
Cost of notification for other responsible persons under Sec.84 of the Act:		
60 large councils + 6 others @ 8 notices per annum (Category A)	528	$273,610
10 small councils +28 others (including windfarms) @ 1 notice per annum (Category B)	38	$19,692
Total estimated annual cost per responsible persons under Sec.84 of the Act	**566**	**$293,301**

Again given that 4 additional wind farm businesses (other responsible persons under sec.84 of the Act) will be affected each year (requiring 1 notice each) over the 5 years, the estimated cost of notification increases by 4 x $518.20 = $2,073 per annum over 5 years . The cost of nofitication over 5 years in 2009 dollars would equal ***$1.57m*** see Table shown in Table A3.13.

[324] This represents the average cost for a notice of 1 eight of page of $135.60 in the Benalla Ensign and $900.80 in the Weekly Times (see Mitchell and Partners (January 2010), Quote, Mitchells in House Copy)
[325] $4.66K + $45.6K + $293.3K

Table A3.13: Annual and 5-year costs of notification of intended cutting or removal of vegetation - Options D and F (*proposed clause.5*)

Category of responsible person	2010/11	2011/12	2012/13	2013/14	2014/15	5 year cost of notificaton 2009 dollars
Transmission company	$4,664	$4,664	$4,664	$4,664	$4,664	**$21,057**
Distribution companies	$45,602	$45,602	$45,602	$45,602	$45,602	**$205,894**
Other responsible persons under Sec.84 of the Act	$293,301	$295,374	$297,447	$299,520	$301,592	**$1,342,344**
Total 5-year PV of costs of notification of affected persons of intended cutting or removal						***$1,569,295***

3.2.3 Costs of providing notification under Option A (proposed clause.5)

Under Option A, adherence to the *proposed code* is voluntary. This section calculates the cost of notification costs under Option A by assuming that the rate of adherence for major electricity companies and other responsible persons under sec.84 of the Act is 90% and 20%, respectively. The costs of notification are estimated by taking the values in Table A3.13 (for Options D and F) and multiplying them with the rates of adherence of 90% for major electric companies and 20% for other responsible persons under sec.84 of Act – as shown in Table A3.14. The total annual cost in 2010/11 is given as **$309,210**[326]. The cost of nofitication over 5 years in 2009 dollars would equal ***$1.41m*** see Table shown in Table A3.14.

Table A3.14: Annual and 5-year costs of notification of intended cutting or removal of vegetation – Option A (*proposed clause.5*)

Category of responsible person	2010/11	2011/12	2012/13	2013/14	2014/15	5 year cost of notificaton 2009 dollars
Transmission company 90% adherence	$4,197	$4,197	$4,197	$4,197	$4,197	**$18,952**
Distribution companies 90% adherence	$41,041	$41,041	$41,041	$41,041	$41,041	**$185,304**
Other responsible persons under Sec.84 of the Act 20% adherence	$263,971	$265,837	$267,702	$269,568	$271,433	**$1,208,110**
Total 5-year PV of costs of notification of affected persons of intended cutting or removal						***$1,412,366***

[326] $4.2K + $41.04K +$263.97K

3.3 Estimated incremental costs of establishing dispute resolution procedures

3.3.1 Cost of establishing dispute resolution procedures - proposed Clause.10 under Options C, D, E and F or existing regulation 9(4)(s) under Option B

The cost of *Clause.10* or *existing regulation 9(4)(s)* is assumed to be zero for each of the existing responsible persons who already have dispute resolution procedures in place[327]. The one off cost of establishment of dispute resolution procedures by new responsible persons is estimated using the following assumptions:

- 4 new responsible persons affected per annum (namely wind farms);
- 10hrs[328] for the establishment of procedures by a council @ $59.42[329]; and
- Time and hourly rate taken by wind farms to set up such procedures taken to be similar to councils.

The annual resource cost for establishing dispute resolution procedures for new responsible persons is therefore estimated to be 4 per annum x 10hrs x $59.42 = **$2,376.88** per annum. Over 5 years and in present value terms this is estimated to be ***$10,731.72***.

3.3.2 Cost of establishing dispute resolution procedures - proposed Clause.10 under Option A

This cost is taken to be 20% of the annual cost (assuming 20% adherence of other persons under sec.84 of the Act) which gives a value of **$475.38** per annum or ***$2,146.34*** over 5 years in present value 2009 dollars.

3.4 Estimated incremental costs of auditing and audit queries for ESV

Auditing activity is divided into two broad categories – electricity transmission and distribution businesses, and other responsible persons under Sec.84 of the Act. Auditing costs for ESV in relation to transmission and distribution businesses are estimated using the following assumptions[330]:

- 2 contractors are employed each year with extensive distribution/transmission business knowledge[331] plus an ESV audit manager oversight[332] who is in charge of the audit activity, including; the audit scope/specification; audit report review; and contract administration – 160hrs of work[333];
- The annual contract cost is $120,000[334]; and
- The hourly charge out rate of the ESV audit manager oversight is $58.5/hr not including on-costs or overhead costs. An on-cost multiplier of 1.165135 is

[327] The cost of resources dedicated to developing dispute resolution procedures should not be confused with the ongoing cost of resources required to actually conduct such dispute resolutions.
[328] Based on advice from 2 councils
[329] See Part 3.1.1 for source of estimate.
[330] Based on information provided by ESV.
[331] Ex SECV district manager.
[332] With professional verifying auditor qualification and experience.
[333] This would include assessment and approval of submitted pans.
[334] This cost is based on past auditing experience.

assumed covering salary related cost such as superannuation, payroll tax and leave entitlements[335] and an overhead cost multiplier of 1.5136 is assumed covering indirect costs such as IT, accommodation, computers and vehicle expenses.

The total annual cost for ESV in auditing electricity transmission and distribution businesses is therefore given by the following formula:

$120,000 (Contracting costs) + 160hrs @ $58.50/hr x 1.165135 x 1.5136 (in house costs) = $120,000 + $16,506.81 = *$136,506.81*

Auditing costs for ESV in relation to other responsible persons under Sec.84 of the Act are estimated using the following assumptions:

- There are 12 audits per annum;
- Audits involve one qualified management system auditor;
- Average audits take 37.5hrs (i.e. 5 working days);
- The hourly charge out rate of the ESV qualified management system auditor is $50.70/hr not including on-costs or overhead costs. An on-cost multiplier of 1.165135 is assumed covering salary related cost such as superannuation, payroll tax and leave entitlements[336] and an overhead cost multiplier of 1.5136 is assumed covering indirect costs such as IT, accommodation, computers and vehicle expenses.

The total annual cost for ESV in auditing other responsible persons is therefore given by the following formula:

12 audits per annum x 37.5hrs x $50.70/hr x 1.165135 x 1.5136 = *$40,235.36*

Total auditing costs for ESV would therefore equal $136,506.81+$40,235.36 or **$176,742.17 per annum** or ***$798,000*** over **5 years** in 2009 present value dollars.

[335] Victorian Competition and Efficiency Commission 2006, (Draft) Guidance Note: Suggested default methodology and values for staff time in BIA/RIS analysis, October.
[336] Victorian Competition and Efficiency Commission 2006, (Draft) Guidance Note: Suggested default methodology and values for staff time in BIA/RIS analysis, October.

3.5 Estimated incremental costs of omission of existing clauses *9.2.1 and 9.2.2* for electrical distribution businesses and other responsible persons under sec.84 of the Act

Clauses *9.2.1 and 9.2.2* would be omitted from the proposed code meaning that clearance spaces in the case of insulated cables would always have to be free of small branches (diameter of less than 10mm) and leaves. This would result in the responsible person needing to maintain clearance of such vegetation, *at all times*. The cost of omitting the clauses is estimated for electricity distribution companies, (i.e. only applies to power lines and not transmission lines) and other responsible persons under sec.84 of the Act, separately.

3.5.1 Cost of omitting exisiting clauses 9.2.1 and 9.2.2 for electricity distribution companies under Options D, E and F

The only cost considered is the estabilishment cost (the initial cost of meeting the requirements of the proposed code) as the proposed code does not force a change in annual maintenance cutting costs (i.e. does not change the normal cuttting cycle). The cost of the omission of clauses *9.2.1 and 9.2.2* for electricity distribution companies is calculated by establishing the amount of overhead service cables affected for each of the distribution companies, as shown in Table A3.15. Data regarding: the number of overhead service cables; the proportion for which the distribution company is responsible for; and the proportion of overhead cables surrounded by vegetation – has been provided by each individual elecricity distribution. The only exception is Country Energy which did not provide an estimate for the proportion of cables surrounded by vegetation. A conservative estimate of 40% is used in Table A3.15 which matches other distribution companies which are supplying the bulk of their services in rural areas. This in turn helps to provide an estimate for the number of services required for the **initial establishment** of additional clearance spaces (over a 5-year cutting cycle).

The net annual number of services required for the inital establishment of clearance spaces in column (t) represents column (s) ***less*** the number of services already being undertaken (i.e. a proportion of (s)).

$$(t) = \big((s)\big) - \big((s) \times X\%\big)$$

Where:

(s) = the number of services required for initial establishment of clearance spaces over a 5 year cycle due to omission of clauses 9.2.1 and 9.2.2; and

X% = the proportion of (s) which is already considered by current cutting activities (removal of solid limbs)

Table A3.15: Number of services for initial re-establishment of clearance spaces due to omission of *clauses 9.2.1 and 9.2.2* - Options D, E and F – electricity distribution companies[337]

Electricity distribution company	Number of overhead service cables affected	Proportion of overhead service cables for which electricity distribution company is responsible	Proportion of overhead service cables surrounded by vegetation	Number of services required for initial establishment of addtional clearance spaces over a 5 year cycle due to omission of clauses	Number of services required for intial establishment less current annual cutting services of solid limbs (i.e. *X%* of initial services for establishment of clearance spaces already covered by annual cutting)
	(p)	(q)	(r)	(s) = (p)*(q)*(r)	(t) = (s) - (s)**X%*
Jemena NE	180,000	40%	70%	50,400	16,632[338]
SPI Electricity Pty Ltd	406,000	50%	40%	81,200	64,960[339]
Citipower	125,000	70%	50%	43,750	39,375[340]
Powercor	340,000	50%	40%	68,000	61,200[341]
United Energy Distribution	395,561	35%	60%	83,068	27,412[342]
Country Energy	204	95%	52[343]	101	48[344]

The costs of omission are estimated using a per service charge of $83.46[345] for the initial establishment of clearing spaces representing the use of two men and one vehicle requiring 30 minutes to cut, plus two men and a tipper/hogger 5 minutes to clean up[346]. A per service charge of and $47.40[347] for annual trimming services including re-visits represents the use of two men and one vehicle requiring 15 minutes to cut plus two men and a tipper/hogger 5 minutes to clean up.

The formula for calculting the annualised one-off costs to electricity distribution companies arising from the omission of clauses *9.2.1 and 9.2.2* is given by:

$$(u) = \left[\left((s) \times \$83.46\right) - \left((s) \times X\% \times \$47.40\right)\right] \div 5\ years$$

[337] All data in Table A3.12 has been provided by distribution companies via data capture sheet.
[338] X% = 67% already covered by annual cutting of solid limbs for Jemena NE.
[339] X% = 20% already covered by annual cutting of solid limbs for SPI Electricity Pty Ltd.
[340] X% = 10% already covered by annual cutting of solid limbs for Citpower.
[341] X% = 10% already covered by annual cutting of solid limbs for Powercor (as with Citipower).
[342] X% = 67% already covered by annual cutting of solid limbs for United Energy Distribution (as with Jemena)
[343]. The estimate based on arithmetic mean of other estimates provided by distribution companies with given that no estimate has been provided by Country Energy.
[344] Proportion already covered by annual cutting is not reported by Country Energy however, is assumed to be an average of the lower and upper range of existing trimming services (i.e. 9% lower for Citipower and Powercor + 67% upper for Jemena NE and United Energy) = 38%. Given the small number of overhead service cables affected, any error in this proportion would have only a negligible impact on the cost estimates for electricity distribution companies as a whole.
[345] Estimate provided by SP AusNet.
[346] Description of typical work required given by SP AusNet.
[347] Estimate provided by SP AusNet.

As shown in Table A3.16, This cost is given as approximately $4.34m per annum or ***$19.61m*** over 5 years in 2009 dollars.

Table A3.16: Annualised and 5-year cost (2009 dollars) arising from omission of clauses *9.2.1 and 9.2.2* under Options D, E and F for electricity distribution companies

Electricity distribution company	Annualised cost for initial establishment of additional clearance spaces (u) = [((s)*$83.46) – ((s)*X%*$47.40)]/5	PV 5-year cost
Jemena NE	$521,156	$2,353,047
SPI Electricity Pty Ltd	$1,201,435	$5,424,543
Citipower	$688,800	$3,109,968
Powercor	$1,070,592	$4,833,779
United Energy Distribution	$858,954	$3,878,224
Country Energy	$1,319	$5,956
Total cost of omitting clauses 9.2.1 and 9.2.2 for electricity distribution companies in 2009 dollars	**$4,342,257**	***$19,605,517***

3.5.2 Cost of omitting exisiting clauses 9.2.1 and 9.2.2 for persons other than distribution businesses under Options D, E and F

The only cost considered is the estabilishment cost as the proposed code does not force a change in annual maintenance cutting costs (i.e. does not change the normal cuttting cycle). In terms of the establishment costs themeselves there are two possiblities. One possibility is that there could be zero establishment cost where cutting is undertaken annually. On the other hand, there could be a positive establishment cost.

Table A3.15 is used in order to estimate the number of services effected by omitting clauses *9.2.1 and 9.2.2* for persons other than distibution businesses. Firstly, column (q) in Table A3.15 is subtracted from 100% providing the following formula for calculating the number of services potentially required for the initial establishment of clearance spaces due to omission of clauses – given as 397,824 services:

$$(y) = \sum_{i=1}^{n} [(p_i) \times (100\% - (q_i)) \times (r_i)]$$

Where:

n = number of distinct electricity distribution categories relating to the number of service cables affected of which there are 6;

(y) = number of services required for the initial establishment of clearance spaces over a 5 year cycle due to omission of clauses;

(p_i) = number of overhead service cables for the i^{th} distribution company category;

$(100\% - (q_i))$ = the proportion of overhead service cables for which persons other than distribution businesses are responsible for (where q_i is the proportion of responsibility allocated to the electricity distribution business for the i^{th} distribution company category; and

(r_i) = the proportion of overhead service cables surrounded by vegetation for the i^{th} distribution company category

Given that the extremes are zero establishment cost and a positive establishment cost, this calculation takes the midpoint that only 50% of effected services will incur an establishment cost. Taking the product of 397,824 services by 50% and the cost of establishing additional[348] initial clearance space of $83.46, the total annual cost is given as $3,320,240[349]:

50% x 397,824services ÷ 5 years x $83.46[350] = $3,320,240

Over 5 years and in present value terms this would be equal to ***$14,991,057***.

3.5.3 Cost of omitting exisiting clauses 9.2.1 and 9.2.2 for electricity distribution companies and other responsbile persons under sec.84 of the Act – Option A

Under Option A, adherence to the *proposed code* is voluntary. This section calculates the cost by assuming that the rate of adherence for major electricity companies and other responsible persons under sec.84 of the Act is 90% and 20%, respectively (See Part 2.7.1 of Appendix 2 for discussion). Given these rates of adherence, the annual cost of omitting existing clauses 9.2.1 and 9.2.2 for electricity distribution companies is given as 90% x $4,342,257[351] per annum or **$3,908,031**. Over 5 years and in 2009 dollars this would be equal to ***$17,644,965***.

The annual cost of omitting existing clauses 9.2.1 and 9.2.2 for other responsible persons under sec.84 of the Act is given as 20% of $3,320,240[352] or $664,048. Over 5 years and in 2009 dollars this would be equal to ***$2,998,211***.

3.6 Estimated incremental costs of omitting existing *clause.11.2*

Existing *Clause 11.2* is omitted from the *proposed code* meaning that vegetation would no longer be allowed to overhang bare overhead power lines in hazardous bushfire risk areas (HBRAs)[353] under certain conditions. The removal of vegetation directly above the clearance space would not be seen as feasible according to SP AusNet 'due to the health and safety risk to personnel attempting to undertake this work…[and]… adverse public reaction'.

According to SP AusNet in order to meet the requirments of the *proposed code* they would have to either 're-construct the lines with insulated cables, or place them underground or a combination of both'. The one-off capital costs of investment to do this has been suggested as $17,500 per span.

However, ESV does not accept the assertions made by SP AusNet for the following reasons. Firslty, it is no longer necessary in all cases to send a 'man-up the tree' to remove branches in difficult terrain as there is no available helicopter vegetation

[348] Additional due to omission of clauses 9.2.1 and 9.2.2
[349] All figures are rounded to whole numbers
[350] See part 3.5.1 for cost per clearance establishment service.
[351] See Table A3.16 for source of estimate
[352] See Part 3.5.2 of Appendix 3 for source of estimate.
[353] As determined by the Country Fire Authority (CFA).

management technology that can work is such inaccessable terrrain. Secondly, post Black Saturday, 'adverse public reaction' is likely to be significantly different from previously. Therefore it is feasible that a significant proportion of this one off investment could be managed under the proposed code by a far cheaper alternative. The cost could range concievably anywhere between $0 to the maximum claimed by SP AusNet and for this reason an average of 50% of $17,500 per span is taken to be more representative of the costs imposed by the regulation.

3.6.1 Cost of omitting existing clause.11.2 under Options D, E and F for electrical distribution businesses

The one-off capital costs of investment in the network in order to comply with the proposed code are presented in Table A3.17 and shown to be equal to an annualised amount of **$4.41m** or approximately ***$19.91m*** over 5 years in 2009 dollars.

Table A3.17: 5-year cost (2009 dollars) of omission of *clause 11.2* under Options D, E and F

Distribution business	Number of spans registered as overhanging the clearance space in HBRA's (a1)	Average cost of one-off investment per span (b1) = 50% of $17,500	Total annualised cost of omission of clause 11.2 (c1) = (a1)*(b1)/5 years	PV 5-year cost
Jemena NE	0	$8,750	0	$0
SPI Electricity Pty Ltd	2000	$8,750	$3,500,000	$15,802,683
Citipower	0	$8,750	0	$0
Powercor	20[354]	$8,750	$35,000	$158,027
United Energy Distribution	500	$8,750	$875,000	$3,950,671
Country Energy[355]	0	$8,750	0	$0
Total cost of omission of clause 11.2 for electricity distribution companies in 2009 dollars			**$4,410,000**	***$19,911,381***

3.6.2 Cost of omitting existing clause.11.2 under Option A for electrical distribution businesses

Assuming a 90% rate of adherence by electricity distribution businesses under Option A (an option which would recommend the *proposed code*) the annualised cost of omitting proposed *clause 11.2* would be given as 90% x $4.41m[356] or $3,969,000 per annum and ***$17,920,243*** over 5 years in 2009 dollars.

[354] Up to 20 spans per year as a result of LBRA to HBRA boundary changes as determined by the Country Fire Authority (CFA)

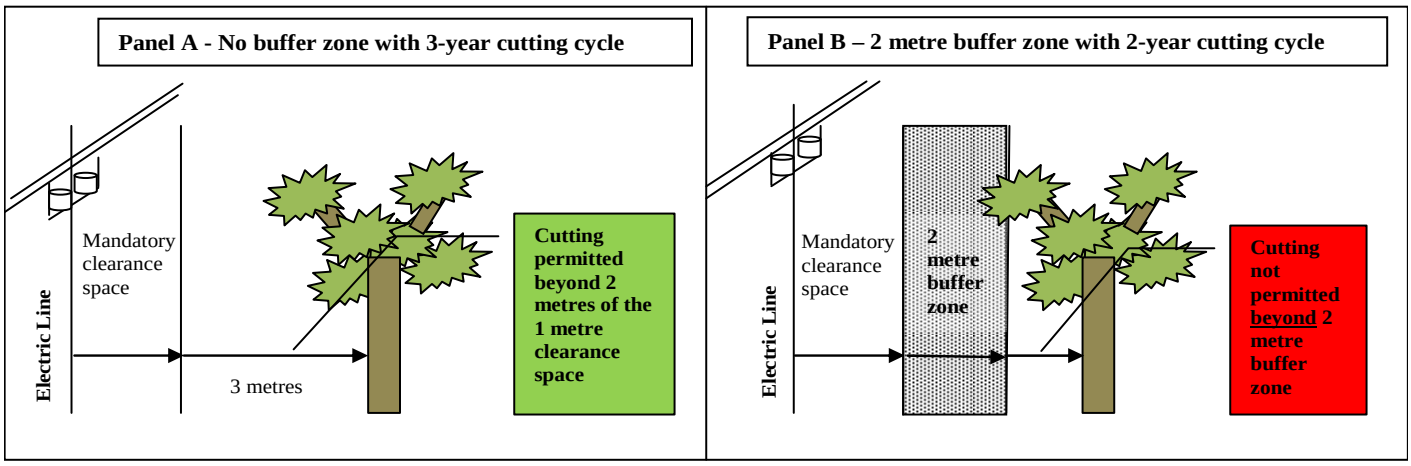
[355] According to Country Energy vegetation overhang is normally targeted for clearing during the cyclic inspection and an annual aerial patrol inspection is also used to overhang on High Voltage lines. The annual aerial patrol in 2009 reported no overhanging trees.

[356] See Table A3.17 for source of estimate

3.7 Estimated incremental costs of providing for buffer zones under Option F for electricity distribution businesses

Adopting a 2 metre buffer zone in Victoria as part of clearance policy would create additional compliance costs to electricity distribution companies. A buffer zone would limit clearance of vegetation to 3 metres as shown in Pane B in illustration A3.1.

Figure A3.1: Illustration of cutting cycles with and without buffer zone



Regrowth rates vary considerably between species but for a moderately growing tree, regrowth is roughly 1 meter per year[357]. As shown in Panel B of Figure A3.1, the responsible person would not be able to cut the limb of the tree beyond the 2 metre buffer zone (within the zone cutting would be permissible). This would entail a reduction in the cutting cycle for distribution companies from 3-years to 2-years. Therefore more frequent clearing would be required to meet electric line clearance spaces. This would increase the cost of clearance to distribution companies[358] by a multiplier of 3/2 or 1.5 under Option F.

In order to estimate the cost of adopting a buffer zone the cost of clearance under the 'base case' is first determined. The cost of electric line clearance is given as $5.7m per annum (2004 dollars) and represents the permitted value by the Essential Services Commission in the final decision for the 2006 pricing review[359]. In 2009 the annual cost of clearance under the 'base case' is given as $6,538,003[360]. Given a multiplier of 1.5 due to a more frequent cutting cycle – this would result in an annual cost of $9,807,004 under Option F. The incremental cost of a buffer zone under Option F would therefore be **$3,269,001** per annum or ***$14,759,712*** over 5 years in 2009 dollars.

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[357] State Electricity Commission of Victoria (October 1987), Vegetation Management Manual, Appendix 3.
[358] Transmission companies already adopt a buffer zone and therefore Option F would have no implication for the costs of this type of business.
[359] Essential Services Commission (October 2006)
[360] Adjustment based on a September 2004 Melbourne CPI index of 144.2 and a September 2009 index of 165.4 (See ABS (June 2009), Consumer Price Index, Cat.no. 6401.0).

3.8 Estimated incremental costs of additional duties of local councils, the Roads Corporation and others

Under both *proposed* and *existing clause 7*, a responsible person must consult railway/tramway or distribution businesses if they are aware of any concerns about the safety of a person cutting or removing vegetation near a power line. ESV advices that this would occur not more than 10 times a year and that consultation would involve a 10 minute email or phone call.

3.8.1 Cost of additional duties of local councils, the Roads Corporation and others (proposed and exisitng clause 7) under Options B, C, D, E and F

An hourly cost of $59.42 (a council clerical rate) from Part 3.1.1 of Appendix 3 is used in order to estimate the additional cost of this existing and proposed clause. The formula for calculating the annual cost under Options B, C, D, E and F of **$99** is calculated in the following way:

10/60 hrs x $59.42 per hour x 10 times a year = $99.04

Over 5-years and in present value dollars this would equal ***$447***.

3.8.2 Cost of additional duties of local councils, the Roads Corporation and others (proposed clause 7) under Option A

Assuming 90% and 20% adherence by major electric companies and other responsible persons under Option A, the additional annual cost of additional duties of **$54** is calculated in the following way (assuming a 50/50 split in responsibilities by major electric companies and other responsible persons):

10/60 hrs x $59.42 per hour x 10 times a year x **50%** x 90% adherence + 10/60 hrs x $59.42 per hour x 10 times a year x **50%** x 90% adherence = $54.47

Over 5-years and in present value dollars this would equal ***$246***.

3.9 Estimated incremental cost of management procedures to minimise danger for distribution companies

Under *proposed* and *existing clause 8*, distribution companies would be required to annually remind occupiers of land of the duties of the responsible person under the existing or proposed code of the dangers involved in pruning and clearing and the precautions that should be taken to safely maintain a private electric line. On advice from ESV, it is taken that this relates specifically to customers in rural Victoria who have private electric lines (namely businesses conducting agricultural activity (i.e. farms)). In 2008 there were 34,177[361] businesses conducting agricultural activity. It is assumed that at least 99% all farms have a connection to the electricity grid and that this is more cost effective that running generators on the growing cost of fuel (the latter being an unsustainable arrangement).

[361] ABS (May 2009), Agricultural Commodities – Australia 2007-08, Cat.no.7121.0

3.9.1 Cost of management procedures to minimise danger for distribution companies (proposed and exisiting clause 8) under Options B, C, D, E and F

The 'reminder' under proposed and existing clause 8 takes the form of a brochure. The average (per unit) printing cost of a brochure is given as $0.15[362] with a postage cost of $0.55 – bringing the total 'reminder' cost to $0.70 per customer.

The additional cost of clause 8 is therefore calculated as being **$23,685** per annum:

34,177 reminders (brochure mailings) per annum x 99% x $0.70 = $23,684.66 per annum

Over 5-years and in 2009 dollars this would equal ***$106,937***.

3.9.2 Cost of management procedures to minimise danger for distribution companies (proposed clause 8) under Option A

Assuming 90% adherence by major electric companies under Option A, the annual cost of additional duties of **$21,316** is calculated in the following way:

34,177 reminders (brochure mailings) per annum x 99% x $0.70 x 90% adherence = $21,316.19 per annum

Over 5-years and in 2009 dollars this would equal ***$96,244***.

3.10 Estimated incremental costs to responsible persons of notification land owners, occupiers and affected persons where urgent cutting or removal is required (*proposed* and *exisiting clause 6*) under Options B, C, D, E and F

The additional costs to responsible persons of notifying land owners, occupiers and affected persons where urgent cutting or removal is required under proposed and existing clause 6 is estimated as 1%[363] of total customers multiplied by the cost of notification assumed to be $0.70[364] per notification (including printing of letter and postage). Total number of customers is used as a proxy for the number of land owners, occupiers and affected persons due to lack of more direct data. The total number of customers for electricity distribution companies is given as 2,475,800 (see Table A2.2 of Appendix 2 for source of estimate). The annual incremental cost of notification for electricity distribution companies in the case of urgent cutting is therefore estimated to be **$17,331**. Over 5 years and in 2009 dollars this is equal to ***$78,249*.** Costs are deemed not to apply to other responsible persons under sec.84 of the Act. The majority of such responsible persons (e.g. councils, VicRoads, Parks Victoria, Melbourne Water, etc) operate electric lines on *public land* and therefore would not need to notify private land owners or occupiers. Farmers (responsible persons under sec.84(2) of the Act) who own private electric lines are also excluded from *existing* and *proposed clause 6*.

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[362] Cost provided by ESV

[363] This reflects the same proportion of kms of electric line affected by urgent cutting and assumes that customers are spaced out evenly across the electricity grid.

[364] Assumed to be the same order of magnitude as the cost of a reminder under Part 3.9.2 of Appendix 3

3.11 Estimated incremental costs to responsible persons of notification land owners, occupiers and affected persons where urgent cutting or removal is required (*proposed clause 6*) under Option A.

Assuming 90% adherence by major electric companies the annual cost of notification in the case of urgent pruning or removal under Option A is given as 90% x $17,331 = **$15,598**. Over 5 years and in 2009 dollars this is equal to ***$70,424***.

3.12 Estimated incremental costs of removal of notification and consultation requirment under *proposed clause 5* under Option E – loss of private property use-value

The removal of *proposed clause 5* under Option E (i.e. resulting in clearance of vegetation with a lack of notification and consultation) would hinder the ability of property occupiers to put in place contingencies for coping with potential disruptions to their private/commercial activities. This is only the case of distribution lines cutting across farm land via easements (private property) and does not pertain to private urban properties (where distribution lines cut accross public land) This would to lead to more conflicts between farm property occupiers and responsible persons entering properties without notice. At the very least, there would be diminution of existing rights to the use and enjoyment of private farming property (i.e. amenity).

The value of loss of private property use is estimated in the following way. The total area of private agricultural land in Victoria is given as 13.9m hectares[365]. The proportion of affected hectares (i.e. area covered by distribution lines) is assumed to be 5%. The average value of a hectare (used as a proxy for valuing farm property) is given as $2000 per hectare[366]. The estimate for the value of relevant hectares is therefore given as ***$1.39b***:

13,900,000 hectares in Victoria x 5% x $ 2,000 per hectare = $1.39b

Given the following assumptions:

- an additional 1% (above the base case) of private farms fail to realise the full use-value of their property as a result of vegetation clearing activities under Option E without notification and consultation; and

- that a lack of notification has a 0.01% impact on such private property (i.e. property owners/occupiers would pay $100 for every $10,000 worth of property value to avoid potential disruptions to their activities);

then this would generate a cost of **$6,950** per annum:

$1.39b x additonal 1% of hectares affected per annum x 0.01% x $2,000 price per hectare = $6,950

[365] Australian Natural Resource Atlas

[366] This is a conservative assumed estimate given that the range is between $1,000 and $4,000 (for properties neighbouring urban areas) (see http://www.dpi.vic.gov.au/DPI/Vro/vrosite.nsf/pages/private-statewide)

This would be worth ***$31,380*** over 5-years in 2009 dollars.

APPENDIX 4

PROPOSED ELECTRICITY SAFETY (ELECTRIC LINE CLEARANCE) REGULATIONS 2010

Electricity Safety (Electric Line Clearance) Regulations 2010

S.R. No.

Draft

TABLE OF PROVISIONS

Version No.

Electricity Safety (Electric Line Clearance) Regulations 2010

S.R. No.

Draft

1 Objectives

The objectives of these Regulations are to—

(a) prescribe the Code of Practice for Electric Line Clearance; and

(b) prescribe—

(i) management procedures for standards and practices to be adopted and observed in tree cutting or removal in the vicinity of electric lines and the keeping of the whole or any part of a tree clear of electric lines; and

(ii) management procedures to minimise danger of electric lines causing fire or electrocution; and

(iii) other matters for or with respect to the maintenance of electric lines; and

(c) provide for management plans relating to compliance with the Code; and

(d) provide for other matters authorised under the Act relating to electric line clearance.

2 Authorising provisions

These Regulations are made under section 157 of the **Electricity Safety Act 1998**.

3 Commencement

These Regulations come into operation on 29 June 2010.

4 Revocation

The following Regulations are **revoked**—

(a) the Electricity Safety (Electric Line Clearance) Regulations 2005[1];

(b) the Electricity Safety (Infringements) Regulations 2000[2].

5 Definitions

In these Regulations—

remove means to remove the whole of a tree above ground level;

the Act means the **Electricity Safety Act 1998**;

Threatened Flora List means the Advisory List of Rare or Threatened Plants in Victoria published by the Department of Sustainability and Environment as published or amended from time to time;

Threatened Invertebrate Fauna List means the Advisory List of Threatened Invertebrate Fauna in Victoria published by the Department of Sustainability and Environment as published or amended from time to time;

Threatened Vertebrate Fauna List means the Advisory List of Threatened Vertebrate Fauna in Victoria published by the Department of Sustainability and Environment as published or amended from time to time;

tree includes part of a tree;

Note:

tree is defined in the Act as including vegetation.

tree of cultural or environmental significance means a tree that is—

(a) included in the Heritage Register within the meaning of the **Heritage Act 1995**; or

(b) included in the Victorian Aboriginal Heritage Register established under section 144 of the **Aboriginal Heritage Act 2006**; or

(c) flora or a habitat of fauna listed as threatened in accordance with section 10 of the **Flora and Fauna Guarantee Act 1988**; or

(d) flora listed in the Threatened Flora List with a conservation status in Victoria of "endangered" or "vulnerable"; or

(e) a habitat of fauna which is—

(i) listed in the Threatened Invertebrate Fauna List with a conservation status in Victoria of "vulnerable", "endangered" or "critically endangered"; or

(ii) listed in the Threatened Vertebrate Fauna List with a conservation status in Victoria of "vulnerable", "endangered" or "critically endangered".

6 Prescribed voltage

For the purposes of the definition of ***low voltage electric line*** in section 3 of the Act, the prescribed voltage is-

(a)1000 volts alternating current; or

(b)1500 volts direct current.

7 Prescribed Code of Practice

For the purposes of Part 8 of the Act, the Code of Practice in the Schedule is prescribed as the Code of Practice for Electric Line Clearance.

8 Prescribed penalty provisions

For the purposes of section 90 of the Act, clauses 2(1), 2(2), 5, 6(3), 6(6), 7, 8(1), 8(2) and 9 of the Code are each a prescribed provision of the Code.

9 Management plans

(1) This regulation does not apply to a responsible person referred to in section 84(2) of the Act.

(2) Before 31 March in each year, a responsible person must ensure that a management plan relating to compliance with the Code for the next financial year is prepared.

Penalty: 20 penalty units.

(3) A responsible person must ensure that a management plan prepared under subregulation (2) specifies the following—

(a) the name, address and telephone number of the responsible person;

(b) the name, position, address and telephone number of the individual who was responsible for the preparation of the management plan;

(c) the name, position, address and telephone number of the persons who are responsible for carrying out the management plan;

(d) the telephone number of a person who can be contacted in an emergency that requires clearance of an electric line that the responsible person is required to keep clear of trees;

(e) the objectives of the management plan;

(f) the land to which the management plan applies by the inclusion of a map;

(g) the location of areas containing trees which may need to be cut or removed to ensure compliance with the Code and that are—

(i) native; or

(ii) listed in a planning scheme to be of ecological, historical or aesthetic significance; or

(iii) trees of cultural or environmental significance.

(h) the means which the responsible person is required to use to identify a tree specified in paragraph (g);

(i) the management procedures that the responsible person is required to adopt to ensure compliance with the Code, which must include details of the methods proposed to be adopted for—

(i) managing trees; and

(ii) maintaining the clearance space, required by the Code, between electric lines and trees;

(j) a description of the measures that must be used to assess the performance of the responsible person under the management plan;

(k) details of the audit processes that must be used to determine the responsible person's compliance with the Code;

(l) the qualifications and experience that the responsible person must require of the

persons who are to carry out the cutting or removal of trees.

Penalty: 20 penalty units.

(4) A responsible person that is a major electricity company must before 31 March in each year submit the management plan to Energy Safe Victoria for approval.

Penalty: 20 penalty units.

(5) A responsible person must provide a copy of the management plan to Energy Safe Victoria on request within 14 days or such longer period as specified by Energy Safe Victoria.

Penalty: 20 penalty units.

(6) A responsible person must provide further information or material in respect of the management plan on request within 14 days or such longer period as specified by Energy Safe Victoria.

Penalty: 20 penalty units.

(7) A responsible person must amend the management plan when instructed to do so by Energy Safe Victoria within 14 days or such longer period as specified by Energy Safe Victoria.

Penalty: 20 penalty units.

(8) A responsible person must not contravene a requirement of a management plan approved by Energy Safe Victoria.

Penalty: 20 penalty units.

(9) A responsible person must ensure that a copy of the management plan is available for inspection by the public at the responsible person's principal office in the State during normal business hours.

Penalty: 20 penalty units.

10 Exemptions

Energy Safe Victoria may exempt a responsible person from any of the requirements of these Regulations subject to any conditions specified by Energy Safe Victoria.

11 Offences for which infringement notices may be served

For the purposes of paragraph (b) of the definition of ***prescribed offence*** in section 140A of the Act, regulations 9(2), 9(3), 9(4), 9(5), 9(6), 9(7), 9(8) and 9(9) are prescribed provisions.

12 Expiry

These Regulations expire on 29 June 2015.

SCHEDULE

Regulation 7

CODE OF PRACTICE FOR ELECTRIC LINE CLEARANCE

PART 1—PRELIMINARY

INTERPRETATION

1 Definitions

(1) In this Code—

aerial bundled cable means an insulated electric line certified as being manufactured in accordance with any of the following—

(a) AS/NZS 3560.1 as amended or published from time to time;

(b) AS/NZS 3560.2 as amended or published from time to time;

(c) AS/NZS 3599.1 as amended or published from time to time;

(d) AS/NZS 3599.2 as amended or published from time to time;

affected person, in relation to the cutting or removal of a tree on land, means an owner or occupier (including a person who is responsible for the management of public land) of adjacent land where the cutting or removal will affect the use of that adjacent land;

away, in relation to a pole holding an electric line, means that section of the electric line that is not near the pole;

constructed includes reconstructed or structurally altered;

hazardous bushfire risk area means—

(a) an area that a fire control authority has assigned a fire hazard rating of "high" under section 80 of the Act; or

(b) an area that—

(i) is not an urban area; and

(ii) has not been assigned a fire hazard rating of “low” under section 80 of the Act;

insulated cable means a low voltage, single or multicore cable with a double or reinforced insulation system;

insulation system has the same meaning as in AS/NZS 3000, as published or amended from time to time;

low bushfire risk area means—

(a) an area that a fire control authority has assigned a fire hazard rating of "low" under section 80 of the Act; or

(b) an urban area;

low voltage means a voltage not exceeding—

(a) 1000 volts alternating current; or

(b) 1500 volts direct current;

near, in relation to a pole holding an electric line, means within a distance to the pole of one-sixth of the span of the electric line;

nominal voltage means the voltage at which the electric line is designed to operate;

powerline means an electric line with a nominal voltage of 66 000 volts or less but does not include a transmission line;

sag, in relation to a conductor, means the vertical displacement of the conductor below the point at which the conductor is attached to the supporting structure and includes any extra displacement caused by hot weather or high load current;

suitably qualified arborist means an arborist who has—

(a) the qualification of National Certificate Level IV in Horticulture and Arboriculture, including the "Assess Trees" module, or an equivalent qualification; and

(b) at least 3 years of field experience in assessing trees;

sway, in relation to a conductor, means the horizontal displacement of the conductor caused by wind;

transmission line means an electric line—

(a) with a nominal voltage of more than 66 000 volts; or

(b) operating at 66 000 volts that is supported on tower structures; or

(c) operating at 66 000 volts that is adjacent to an electric line that has a nominal voltage greater than 66 000 volts.

(2) In this Code, unless the context otherwise requires, all words and expressions have the same meaning as in the Act.

PART 2—CLEARANCE SPACE AND HAZARD TREE REQUIREMENTS FOR ALL ELECTRIC LINES

2 Clearance space for electric lines

(1) A responsible person must create and maintain the required clearance space around a powerline in accordance with Parts 2 and 3 of this Code and the Schedule to this Code.

(2) A responsible person that owns or operates a transmission line must, in accordance with Parts 2 and 3 of this Code and the Schedule to this Code—

(a) manage trees below the transmission line to mitigate, as far as practicable, the fire risks associated with the fuel load below the transmission line; and

(b) manage trees adjacent to the transmission line to avoid, as far as practicable, a tree entering the minimum clearance space around that line if the tree falls; and

(c) create and maintain the required clearance space around the transmission line.

(3) A responsible person must, as far as practicable, restrict cutting or removal of native trees or trees of cultural or environmental significance to the minimum extent necessary to ensure compliance the requirements of Parts 2 and 3 of this Code and the Schedule to this Code or to make an unsafe situation safe.

3 Hazard tree

If a person identifies a tree as likely to fall onto or otherwise come into contact with an electric line a

responsible person may cut or remove the tree provided that—

(a) the tree has been assessed by a suitably qualified arborist; and

(b) that assessment confirms the likelihood of contact with an electric line having regard to foreseeable local conditions.

4 Habitat trees

(1) If a tree is the habitat for fauna that is—

(a) listed as threatened in accordance with section 10 of the **Flora and Fauna Guarantee Act 1988**; or

(b) listed in the Threatened Invertebrate Fauna List with a conservation status in Victoria of "vulnerable", "endangered" or "critically endangered"; or

(c) listed in the Threatened Vertebrate Fauna List with a conservation status in Victoria of "vulnerable", "endangered" or "critically endangered" —

cutting or removal of that tree must be undertaken outside of the breeding season for that species wherever practicable.

(2) If it is not possible to undertake cutting or removal of that tree outside of the breeding season for that species, translocation of the fauna must be undertaken wherever practicable.

5 Notification and consultation

(1) This clause applies to a responsible person who, in order to maintain the required clearance space around an electric line, intends to cut or remove a tree that is—

(a) within the boundary of a private property which the responsible person neither occupies nor owns; or

(b) a tree of cultural or environmental significance.

(2) Subject to clause 6, a responsible person must give notice of the intended cutting or removal to all affected persons.

(3) If the tree intended to be cut or removed is a tree of cultural or environmental significance, notice under this clause must include details of—

(a) the impact of the cutting or removal of the tree; and

(b) the actions to be taken to minimise that impact.

(4) Notice under this clause must be given—

(a) at least 14 days and not more than 60 days before the intended cutting or removal is to occur; and

(b) in writing or by publication in a newspaper circulating generally in the locality of the land in which the tree is to be cut or removed.

(5) If the tree intended to be cut or removed is within the boundary of a private property, the responsible person must consult—

(a) if the tree is to be cut—the occupier of the property; or

(b) if the tree is to be removed—the owner of the property.

6 Urgent cutting or removal

(1) This clause does not apply to a responsible person referred to in section 84(2) of the Act.

(2) A responsible person is not required to comply with clause 5 if that person, in accordance with this clause, undertakes urgent cutting or removal that is required—

(a) as a result of encroachment or growth of trees that was not anticipated in the management plan; or

(b) as a result of a tree falling or becoming damaged so that it is required to be cut or removed to maintain the required clearance space; or

(c) if the aborist's assessment under clause 3 confirms the imminent likelihood of contact with an electric line having regard to foreseeable local conditions; or

(d) during the fire danger period declared under the **Country Fire Authority Act 1958**.

(3) A responsible person that has undertaken urgent cutting or removal in accordance with this clause must, as soon as practicable after completing the cutting or removal, give notice of that cutting or removal to—

(a) all affected persons; and

(b) the occupier of the land on which the tree was cut or removed; and

(c) if a tree was removed—the owner of the land on which the tree was removed.

(4) A responsible person that has undertaken any urgent cutting or removal in accordance with this clause must record the following details—

(a) where and when the cutting or removal was undertaken;

(b) why the cutting or removal was required;

(c) the last inspection of the section of the electric line where the cutting or removal was required.

(5) A responsible person that must keep records of the details recorded under subclause (4) for at least 5 years.

(6) A responsible person that undertakes urgent work referred to in subclause (2)(a) or (2)(d) must not remove or cut trees further than 1 metre from the minimum clearance space around the electric line.

7 Additional duties of local councils, the Roads Corporation and others

If a responsible person referred to in section 84(4) or (6) of the Act is aware of the concerns of any person about the safety of cutting or removal of trees near a powerline, the responsible person must consult—

(a) if a railway company or tramway company owns or operates that powerline— the railway or tramway company; and

(b) in any other case— the distribution company that is responsible for distributing power to that powerline.

8 Management procedures to minimise danger

(1) A distribution company must, at least once a year, advise occupiers of land above the surface of which there is a private electric line that is within the distribution company's distribution area of the following matters—

(a) the duties of the responsible person under this Code;

(b) the dangers of cutting and removing trees;

(c) the precautions that should be taken to safely maintain the line.

(2) A distribution company must, in relation to its distribution area, on the request of a responsible person advise that person—

(a) how to identify places where the cutting or removal of trees will be required; and

(b) where to obtain advice and information on methods for maintaining clearance between electric lines and trees.

9 Dispute resolution

A responsible person must establish procedures to be followed for the independent resolution of disputes relating to electric line clearance.

PART 3—ELECTRIC LINE CLEARANCE

10 Aerial bundled cables and insulated cables in all areas

(1) This clause applies to a powerline that is constructed with—

(a) aerial bundled cable; or

(b) insulated cable.

(2) For a powerline of a type specified in column 1 of Table 1, the minimum clearance space extends, in all directions—

(a) for the sections near the pole—to the distance specified in column 2 for a powerline of that type; and

(b) for sections away from the pole—to the applicable distance specified in columns 3 to 5, as the case requires, for a powerline of that type.

(3) The required clearance space around a powerline is the smallest space such that if a tree were cut or removed from that space, the tree would not grow into the minimum clearance space around that powerline between cutting times.

11 Powerlines other than aerial bundled cable or insulated cables in low bushfire risk areas

(1) This clause applies to a powerline that is—

(a) not constructed with—

(i) aerial bundled cable; or

(ii) insulated cable; and

(b) located in a low bushfire risk area.

(2) For a powerline of a nominal voltage specified in column 1 of Table 2, the minimum clearance space extends, in all directions—

(a) for sections near the pole—to the distance specified in column 2 for a powerline of that nominal voltage; and

(b) for the sections away from the pole—to the applicable distance specified in columns 3 to

6, as the case requires, for a powerline of that nominal voltage.

(3) For a powerline which is longer than 100 metres, the minimum clearance space extends, for sections away from the pole, to an additional distance which allows for the sag and sway of the conductors.

(4) The required clearance space for a powerline is—

(a) the smallest space such that if a tree were cut or removed from that space, the tree would not grow into the minimum clearance space around that powerline between cutting times; and

(b) for a powerline with a nominal voltage of

66 000 volts—the space above the space described in paragraph (a).

12 Powerlines other than aerial bundled cable or insulated cables in hazardous bushfire risk areas

(1) This clause applies to a powerline that is—

(a) not constructed with—

(i) aerial bundled cable; or

(ii) insulated cable; and

(b) located in a hazardous bushfire risk area.

(2) For a powerline of a nominal voltage specified in column 1 of Table 3, the minimum clearance space extends, in all directions except vertically upwards—

(a) for sections near the pole—to the distance specified in column 2 for a powerline of that nominal voltage; and

(b) for sections away from the pole—to the applicable distance specified in columns 3 to

5, as the case requires, for a powerline of that nominal voltage.

(3) The minimum clearance space around a powerline extends, for sections away from the pole, to an additional distance which allows for the sag and sway of the conductors.

(4) The required clearance space around a powerline is—

(a) the smallest space such that if a tree were cut or removed from that space, the tree would not grow into the minimum clearance space around that powerline between cutting times; and

(b) the space above the space described in paragraph (a).

13 Transmission lines

(1) For a transmission line of nominal voltage specified in column 1 of Table 4, the minimum clearance space extends—

(a) downwards —to the distance specified in column 2 for a transmission line of that nominal voltage; and

(b) horizontally—to the applicable distance specified in columns 3, for a transmission line of that nominal voltage.

(2) The minimum clearance space around a transmission line extends to an additional distance which allows for the sag and sway of the conductors.

(3) The required clearance space around a transmission line is—

(a) the smallest space such that if a tree were cut or removed from that space, the tree would not grow into the minimum clearance space around that transmission line between cutting times; and

(b) the space above the space described in paragraph (a).

SCHEDULE TO CODE OF PRACTICE

TABLE 1

Clauses 2(1) and 10

MINIMUM CLEARANCE SPACES SURROUNDING A POWERLINE—ALL AREAS

Aerial Bundled Cable or Insulated Cable

MINIMUM CLEARANCE SPACES IN ALL DIRECTIONS				
	Near pole	Away from pole		
1	2	3	4	5
Type of Powerline	All Spans near the pole	Spans up to and including 40 metres	Spans exceeding 40 metres up to and including 70 metres	Spans exceeding 70 metres
Aerial Bundled Cable	300 mm	300 mm	600 mm	900 mm
Insulated Cable	600 mm	600 mm	1000 mm	1000 mm

Notes:

1. An additional distance must be added to the minimum clearance space to allow for regrowth during the period between cutting times (see clause 10(3)).
2. This Table includes allowances for cable sag and sway.
3. Table 1 is partially illustrated in Figures 1, 2 and 3.

TABLE 2

Clauses 2(1) and 11

MINIMUM CLEARANCE SPACES SURROUNDING A POWERLINE—LOW BUSHFIRE RISK AREAS

Other Than Aerial Bundled Cable or Insulated Cable

MINIMUM CLEARANCE SPACES IN ALL DIRECTIONS					
	Near Pole	Away from pole			
1	2	3	4	5	6
Nominal voltage	Section of all spans near the pole	Spans up to & including 45 metres	Spans exceeding 45 metres, up to & including 70 metres	Spans exceeding 70 metres, up to & including 100 metres	Spans exceeding 100 metres
Up to1kV	1000 mm	1000 mm	2000 mm	2500 mm	2500 mm
Over 1kV, less than 66 kV	1500 mm	1500 mm	2000 mm	2500 mm	2500 mm
66 kV	2250 mm	2500 mm	3000 mm	3500 mm	3500 mm

Notes:

1. An additional distance must be added to the minimum clearance space to allow for regrowth during the period between cutting times (see clause 11(4)).
2. This Table includes allowances for cable sag and sway for spans up to and including 100 metres.
3. For spans exceeding 100 metres, an additional distance must be added to the minimum clearance space to allow for sag and sway of the conductors (see clause 11(3)).
4. Table 2 is partially illustrated in Figures 1, 4 and 5.

TABLE 3

Clauses 2(1) and 12

MINIMUM CLEARANCE SPACES SURROUNDING A POWERLINE—HAZARDOUS BUSHFIRE RISK AREAS

Other Than Aerial Bundled Cable or Insulated Cable

MINIMUM CLEARANCE SPACES IN ALL DIRECTIONS				
	Near Pole	Away from pole		
1	2	3	4	5
Nominal voltage	Section of all spans near the pole	Spans up to & including 45 metres	Spans exceeding 45 metres, up to & including 350 metres	Spans exceeding 350 metres
Up to1kV	1500 mm	1500 mm	2000 mm	2250 mm
Over 1kV, less than 66 kV	1500 mm	1500 mm	2000mm	2250 mm
66 kV	2250 mm	2250 mm	3000 mm	3000mm

Notes:

1. An additional distance must be added to the minimum clearance space to allow for regrowth during the period between cutting times (see clause 12(4)).
2. An additional distance must be added to the minimum clearance space to allow for sag and sway of the conductors (see clause 12(3)).
3. Table 3 is partially illustrated in Figures 1 and 5.

TABLE 4

Clauses 2(2) and 13

MINIMUM CLEARANCE SPACES SURROUNDING A TRANSMISSION LINE

1	2	3
Nominal Voltage	*Dimension Vertical Below*	*Dimension Horizontal*
66 kV	3000 mm	3000 mm
Over 66kV less than 220kV	3700mm	4600mm
220 kV	3700 mm	4600 mm
275 kV	4200 mm	5000 mm
330 kV	4700 mm	5500 mm
500 kV	6400 mm	6400 mm

Notes:

1. An additional distance must be added to the minimum clearance space to allow for regrowth during the period between cutting times (see clause 13(3)).
2. An additional distance must be added to the minimum clearance space to allow for sag and sway of the conductors (see clause 13(2)).
3. For transmission line spans up to 400m, sag can often be of the order of 4 metres.
4. For transmission line spans up to 400m, the additional allowance for sway can often be of the order of 8 metres.
5. Table 4 is partially illustrated in Figures 6 and 7.

FIGURE 1: ALL AREAS

Tables 1, 2 and 3

PLAN VIEW OF AN OVERHEAD POWERLINE

NOT TO SCALE

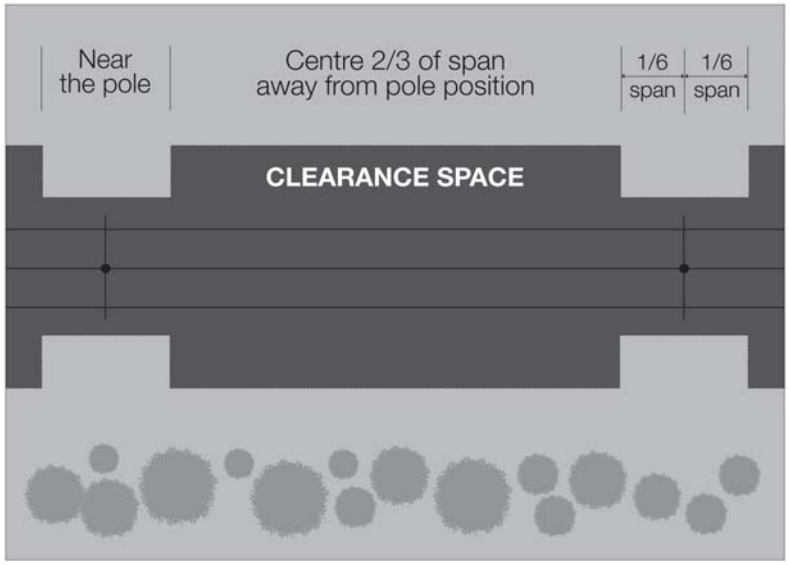
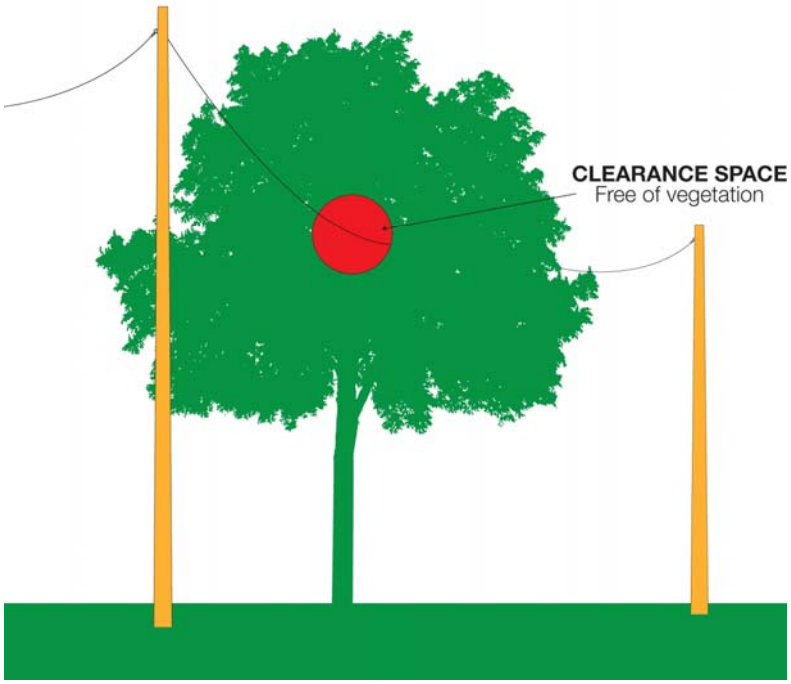


Figure 2: ABC & INSULATED SERVICE LINES ALL AREAS

Table 1



NOT TO SCALE

Figure 3: INSULATED CONDUCTORS ALL AREAS

Table 1

NOT TO SCALE

Figure 4: Low Bushfire Risk Areas (except 66 kV)

Table 2

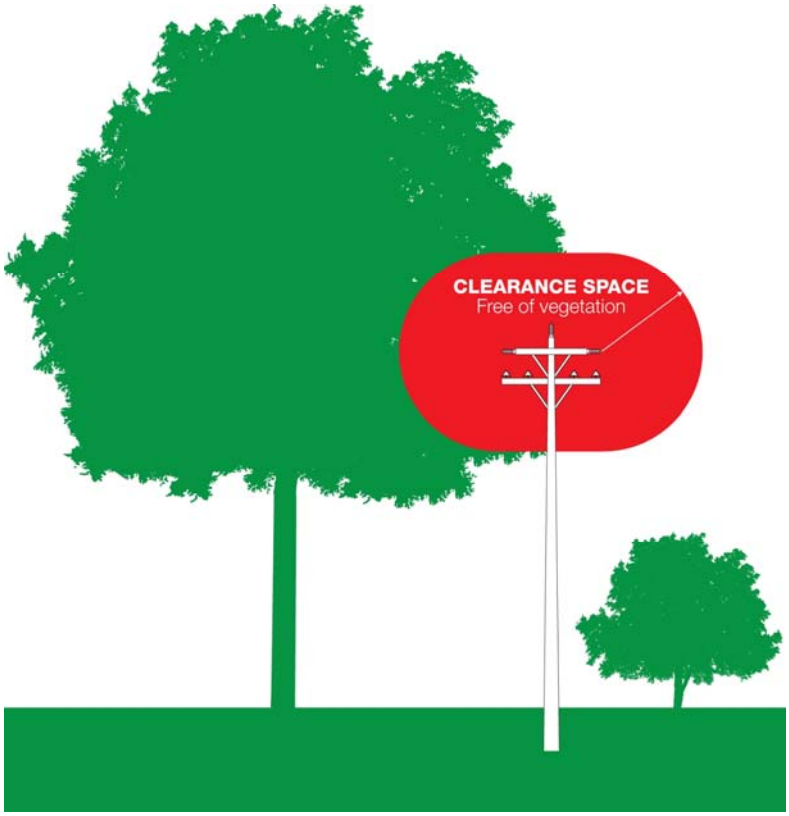


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Figure 5: Hazardous Bushfire Risk Areas and 66 kV in Low Bushfire Risk Areas

Table 3

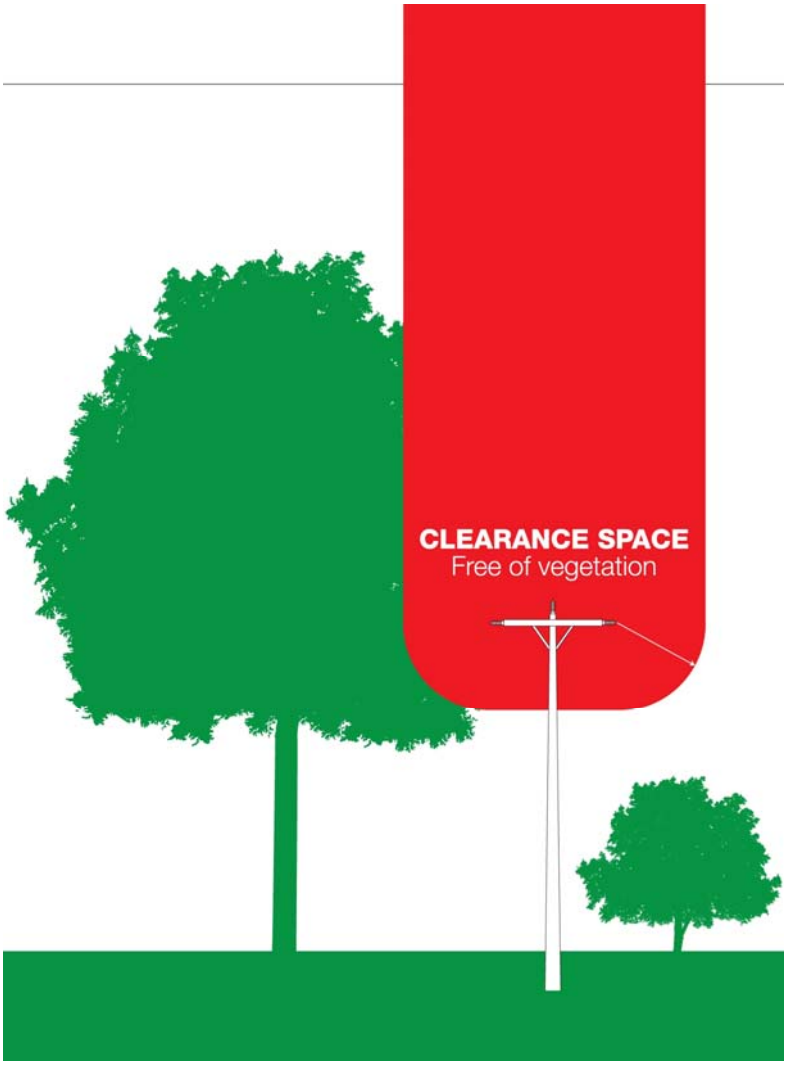

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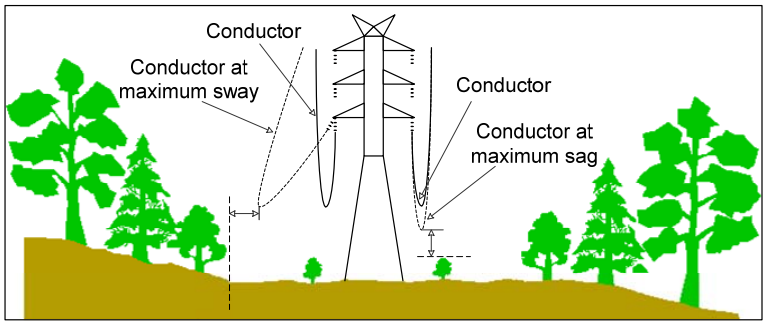
Figure 6: END VIEW OF THE TRANSMISSION LINE

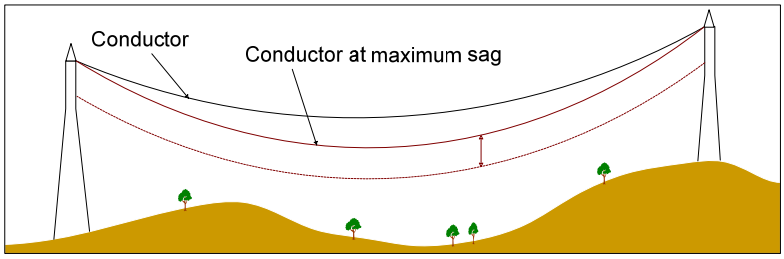
Table 4



NOT TO SCALE

Figure 7: SIDE VIEW OF THE TRANSMISSION LINE

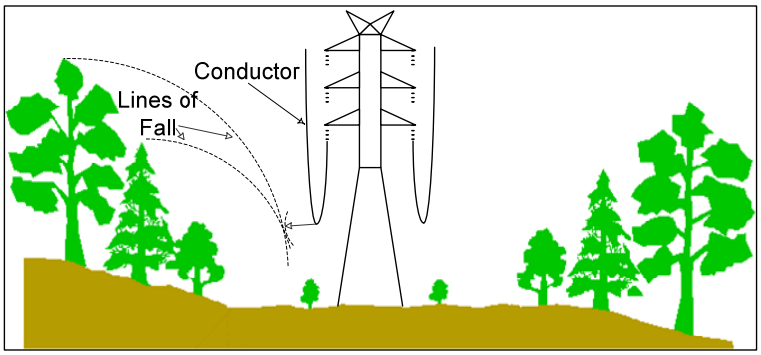
Table 4



NOT TO SCALE

Figure 8: TREES ADJACENT TO THE TRANSMISSION LINE

Table 4



NOT TO SCALE

ENDNOTES

Endnotes

[1] Reg 4: S.R. No. 74/2005.

[2] Reg 4: S.R. No. 136/2000.

Table of Applied, Adopted or Incorporated Matter Required by the Subordinate Legislation Regulations 2004

Note that the following table of applied, adopted or incorporated matter is included in accordance with the requirements of regulation 5 of the Subordinate Legislation Regulations 2004.

Statutory Rule Provision	**Title of applied, adopted or incorporated document**	**Matter in applied, adopted or incorporated document**
Regulation 5 Definition of ***Threatened Flora List***	Advisory List of Rare or Threatened Plants in Victoria, published in 2005 by the Department of Sustainability and Environment	The whole
Regulation 5 Definition of ***Threatened Invertebrate Fauna List***	Advisory List of Threatened Invertebrate Fauna in Victoria, published in 2009 by the Department of Sustainability and Environment	The whole
Regulation 5 Definition of ***Threatened Vertebrate Fauna List***	Advisory List of Threatened Vertebrate Fauna in Victoria, published in 2007 by the Department of Sustainability and Environment	The whole

Schedule 1, clause 1(1) Definition of ***aerial bundled cable***	AS/NZS 3560.1, "Electric cables—Cross linked polyethylene insulated— Aerial bundled—For working voltages up to and including 0.6/1(1.2) kV - Aluminium conductors", published 7 April 2000 by Standards Australia and Standards New Zealand	The whole
	AS/NZS 3560.2, "Electric cables—Cross linked polyethylene insulated— Aerial bundled—For working voltages up to and including 0.6/1(1.2) kV - Copper conductors", published 17 July 2003 by Standards Australia and Standards New Zealand	The whole
	AS/NZS 3599.1, "Electric cables—Aerial bundled—Polymeric insulated—Voltages 6.35/11 (12) kV and 12.7/22 (24) kV - Metallic screened", published 11 September 2003 by Standards Australia and Standards New Zealand	The whole
	AS/NZS 3599.2, "Electric cables—Aerial bundled—Polymeric insulated—Voltages 6.35/11 (12) kV and 12.7/22 (24) kV – Non-metallic screened", published 5 June 1999 by Standards Australia and Standards New Zealand	The whole
Definition of ***insulated cable***	AS/NZS 3000, "Electrical installations (known as the Australian / New Zealand Wiring Rules)", published 12 November 2007 by Standards Australia and Standards New Zealand and re-issued incorporating Amendment No.1 which was published on 30 July 2009	Clause 1.4.60