vector

vector submission

tree regulations review

annex 1

APRIL 2023

contents

purpose

This is to support the development of a best practice guide for risk-based vegetation management by setting, at a high level, an approach to determine the risk of vegetation coming into contact with electricity assets to support an effective and proportionate mitigation.

This is intended to act as a starting point in developing guidance which supports efficient vegetation management which is proportionate to, and effective in mitigating, risk. Specifically, this is to address risks which are referred in the amended Electricity Industry (Hazards from Trees) regulations 2003 / Amendment 2023. We recommend that the amended regulations give affect to a best practice guide for risk-based vegetation management by reference.

The resulting guidance should offer all stakeholders – tree owners and works owners – with clarity on best practice, risk-based vegetation management making rights and responsibilities for risk-based vegetation management clear.

The resulting guide should sit at the principle end of process, as demonstrated below:

As such it is designed to be applicable to different risks, across different regions and for implementation by different personnel. Stakeholders' adherence to risk-based vegetation management should be clear from this guidance and from tree and works owners' approaches.

As with all risk assessments, a risk based approach to vegetation management involves identifying the source of risks (e.g. modes of vegetation failure- such as a tree falling), the risk consequences (e.g. 10,000 customers without power) and the likelihood of those consequences occurring. These factors, result in an overall assessment of risk.

In the case of health and safety risk, and fire risk, it is recommended that these consequences have a higher weighting – or a multiplier effect – on the overall risk score.

The overall risk assessment should then be used to inform action which is effective in mitigating the risks which require treatment.

Overall, the link between a risk assessment and an action should be relatively binary in the best practice guide. That is – the risk assessment should clearly point to action being required or not. In terms of the action that is required – it needs to remove the risk that warrants action (i.e., the risk of overhanging debris falling or a whole tree collapsing.

key components of risk-based vegetation management

Consequence assessment

Determining the consequence of an event could largely be determined by a desk top based exercise, identifying 'system level attributes' or 'influencing factors' which are relevant to the impact of a potential event. This would include but not be limited to the importance of that part of the network – i.e., its connection to the sub-transmission network, and/or to the number of customers connected; areas or sections with high cost of network repair; or, critical network sections providing significant supply to the community.

As well as informing the consequence rating this desktop based exercise could also serve as an 'initial priority assessment' to inform which areas should be prioritised for on site assessment first. The EEA/ ENA 2016 "Risk Based Vegetation Management Guide", provides further guidance on this consequence assessment.

Overall, a consequence rating for a section of the network would typically be pre determined before the on-site assessment is undertaken – however as below, factors observed on site may change this consequence rating as well.

The following could be considered in determining the consequence rating:

- Number of customers' supplied by each zone substation
- Estimated response time
- Service level type: residential, rural and urban, commercial, industrial, and CBD
- Installed capacity (MVA)
- Load demand
- Backstop capacity shortfall (MVA). The forecasted load demand that cannot be supplied by an adjacent zone substation in the event of a zone wide outage.
- Scale of vegetation – i.e., of tree, branch, amount of debris
- Special issues – e.g., buz bar on transformer has very close points of contact so bark from eucalyptus can easily get stuck
- Sub transmission line or spur line
- Cost of asset repairs

key components of risk-based vegetation management (cont)

Likelihood assessment

This is to determine the likelihood of the consequences occurring by vegetation making contact with the electricity network. This is likely to occur through one of the below modes of tree failure:

a. Whole tree failure
b. Branch failure
c. Contact Risk
d. Debris falling

The first step is to assess the distance of the vegetation (including branches and debris) from the electricity assets, to determine whether or not a failure would be likely to result in vegetation coming into contact with assets. If it would not (i.e., because the tree is too far away), then the tree is out of scope of the risk assessment.

Mode of failure	If this failure were to occur would it result in vegetation coming into contact with electricity assets?
Whole tree failure	Y
Branch failure	N
Debris falling	N
Contact occurring	Y
Disturbance to underground assets	Y

If a mode of failure would be likely to result in the tree having contact with the electricity network then an assessment of the likelihood of that mode of failure should be undertaken.

Note that a likelihood assessment should be inclusive of an assessment of modes of vegetation failure, but need not be limited to this. That is – there may be other drivers of risks / events which are not included in the above table, but which warrant consideration.

Key Likelihood factors

Note that these are not exhaustive – works' owner could add their own additional factors.

Key likelihood factors
Species
Topography
Soil
Overland flow path
Vitality – age, health
Anatomy – structure and stability – *include a note of any pathogens here*
Load - i.e., is the tree supporting other vegetation?
Defects
Growth response – i.e., what is the likely growth response and how does it contribute to risk?

A likelihood assessment should be supported by a Visual Tree Assessment (VTA).

key components of risk-based vegetation management (cont)

Visual Tree Assessment

A VTA is to identify and investigate issues that could increase the likelihood (or consequence) of a tree coming into contact with vegetation.

It involves observing all parts of the tree visually, looking for signs of structural weakness. This model is derived from the principles of biomechanics and includes assessing a tree's growth response and form. For example, it could include identification of:

- Timber decay
- Lightning damage
- Poorly attached branches
- Dead overhanging branches
- Elongated overhanging branches
- Ribbon bark shedding
- Root damage
- Soil erosion

Taking into account these likelihood factors a score should be assigned reflecting the likelihood of an event occurring.

Total risk rating

The consequence assessment should be incorporated with the likelihood score for the relevant modes of failure (or event relevant to the risks captured by the regulations), resulting in a total risk assessment.

The consequence rating should be sensitive to different types of risks- with health and safety and fire risk for instance – achieving a heavier weighting – or a multiplier.

Application of assessment to multiple trees

If there are a large number of trees which, should they each be subject to an individual assessment, would result in a very similar score, the same score should be applied. 'Very similar' should allow for a degree of variation which would result in the same recommended action (i.e., if it is likely that they would all result in a similar risk score they should all be treated the same. If the variance however would result in a different recommended course of action then a separate assessment should be undertaken).