Powerline Bushfire Safety Committee

26 June 2018

Paul Fearon
Director Energy Safety
Energy Safe Victoria

Advice: AusNet Services Exemption requests dated 29 May 2018

In your letter dated 08 June 2018, you requested the advice of the Powerline Bushfire Safety Committee (PBSC) whether on balance the implementation of six proposed exemptions to obligations would materially adversely impact on the mitigation of powerline bushfires risk.

AusNet Services submitted six exemption applications regarding the protecting of certain HV customers' facilities from the over-voltage effects that occur during the operation of Rapid Earth Fault Current Limiters (REFCL). The applications only cover assets owned by AusNet Services. The applications address two distinct regulatory aspects.

The PBSC advises that after due consideration it has concluded the exemptions sought in respect of Major Electricity Company (MEC) obligations under Electricity Safety (Bushfire Mitigation) Regulations 2013 (as amended in April 2016) r.7(1)(ha) and r.7(1)(hb) on balance do not materially adversely impact on the mitigation of bushfires from electricity networks.

The PBSC would support the conditions outlined in the ESV Technical Assessments as appropriate controls on any associated residual or future bushfires risk.

In the case of the exemptions sought in respect of Section 120M of the Electricity Safety Act 1998, the PBSC has concluded that broader issues related to HV customer assets must be addressed if adverse impacts on powerline bushfire safety are to be adequately ruled out (see Section 5 of this advice).

The PBSC notes that:

1. On a 'plain English' reading, the Electricity Safety Act 1998 Section 120M in effect requires an MEC to deliver the required capacity on the entirety of each polyphase electric line emanating from any of the specified zone substations irrespective of ownership of the line. The PBSC understands this interpretation to be aligned with the expert legal advice available to ESV.
2. The exemption applications describe a network topology that shows that the MEC will not deliver the required capacity on those sections of the polyphase electric line that are located on the customer side of the HV customer's point of supply; and
3. The exemption applications do not appear to provide any indication of either any intention to seek exemptions from these obligations in relation to sections of a polyphase electric line beyond the HV customer's point of supply, nor any rationale to justify that the MEC will not be delivering the required capacity for those sections of the line.

Therefore, in respect of exemptions sought from MEC obligations under Section 120M of the Act, the PBSC advises that the adequate management of bushfire risks from assets owned by HV customers must be subject to a similar robust standard of evidence and controls as that set out in the conditions described in ESV Technical Assessments for MEC assets.

Provided ESV establishes effective mechanisms to achieve this, and provided the evidence so gathered confirms the statements in the applications regarding the construction type of powerlines owned by HV customer, the PBSC would support the requested exemptions.

1. Background

On 29 May 2018, AusNet Services submitted six exemption applications to ESV to allow the use of isolating transformers to limit the exposure of certain HV customers' facilities to variations in phase-to-earth voltage on its networks that supply those customers. Such variations have always occurred on distribution networks, but the installation of REFCLs is likely to make them more frequent and of longer duration. The operation of a REFCL would be expected to give rise to voltages that exceed those currently permitted by the Electricity Distribution Code (EDC) issued by the Essential Services Commission, Victoria (ESCV). This aspect of the EDC is under review by the ESCV.

You requested the Powerline Bushfire Safety Committee to provide advice whether on balance, the proposed exemptions being sought by AusNet Services materially adversely impact the mitigation of powerline bushfire risk.

2. Context

Section 120M of the Electrical Safety Act 1998 (Act) requires MECs to ensure that every polyphase electric line originating from a specific substation has the ability to reduce the voltage on a faulted conductor in accordance with prescribed performance standards. The Act does not limit this obligation to those sections of the powerline that are owned by the MEC.

The Act is supported by the Electricity Safety (Bushfire Mitigation) Regulations 2013 (as amended in April 2016) (Regulations) which require an MEC to provide details in its Bushfire Mitigation Plan of how it will ensure that each polyphase line emanating from a specific substation has the specified performance and details of how it will confirm by annual test that the required performance is available. The relevant parts of the Regulations are r.7(1)(ha) and r.7(1)(hb). The Regulations explicitly (using the qualification "within its supply network") require these details only in respect of those parts of powerlines owned by the MEC.

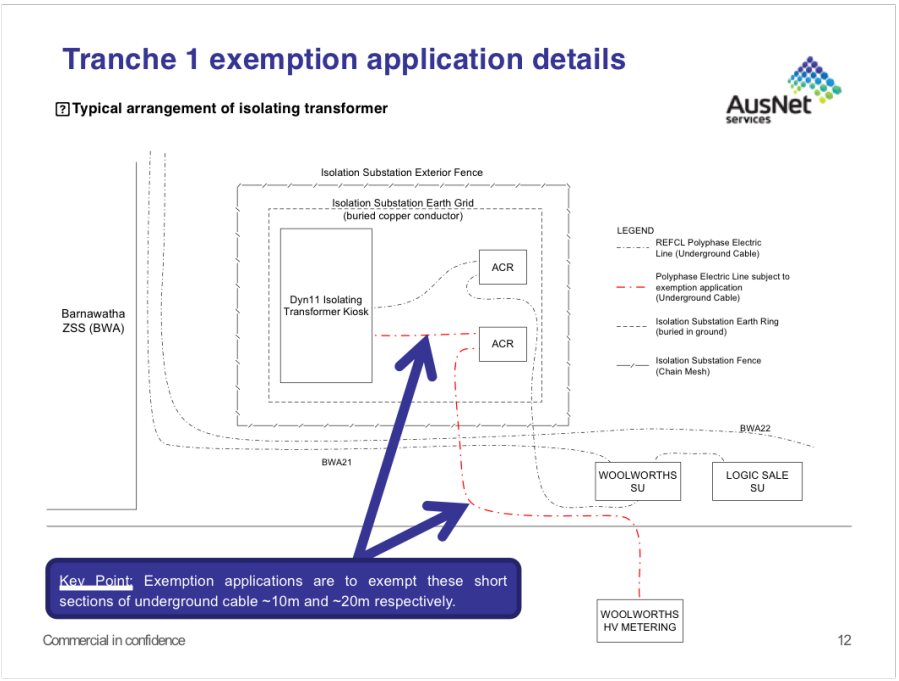
In cases where customers take supply at high-voltage, the polyphase electric line extends into the customer's premises. A point on the line, usually close to the property title boundary, is formally designated in the supply agreement between the customer and the network owner to be the customer's point of supply.

3. The Applications

AusNet Services has submitted six formal applications seeking to exempt parts of polyphase electric lines emanating from complying substations from the prescribed performance standards, specifically from Section 120M of the Act and from r.7(1)(ha) and r.7(1)(hb) of the Regulations.

The applications only cover assets owned by AusNet Services. They are specific in detailing that the part of the polyphase electric line to be exempted is that between the customer side of a planned isolating transformer and the customer's point of supply. The applications do not seek any ESV action in respect of the section of the line that extends from the customer's point of supply into the customer premises.

A typical example of the powerline arrangements detailed in the applications is that shown in AusNet Services presentation to the PBSC at its meeting on 13 March 2018:



The applications all contain schematic diagrams similar to that shown above. All of the powerline segments covered by the six applications are underground cable construction terminated within metal-clad enclosures. The tables below summarise the requested exemptions:

HV Customer	Zone Substation	Length of polyphase electric line to be exempt	
		Isolating transformer to protection device (ACR)	Protection device (ACR) to customer point of connection
Pacific Hydro	Rubicon A	10m	75m
Pacific Hydro	Wangaratta	10m	75m
Australian Textile Mills	Wangaratta	10m	20m
Uncle Toby's	Barnawartha	10m	20m
Woolworths	Barnawartha	10m	20m

The Wonthaggi Wind Farm is planned to have two isolating transformers:

HV Customer	Zone Substation	Length of polyphase electric line to be exempt		
		1st isolating transformer to the 2nd isolating transformer	1st isolating transformer to protection device (ACR)	Protection device (ACR) to customer point of connection
Wonthaggi Wind Farm	Wonthaggi	10m	10m	65m

4. Risk Consideration

Sections of the electric line on the customer's side of the isolation transformer will not be REFCL protected, i.e. will not be capable of delivering the required capacity defined in the Regulations. This includes the sections of line for which exemption has been sought.

The sections of powerline proposed for exemption are all planned to be constructed as underground cable terminated in metal-clad kiosk transformers and switchgear. From a risk perspective the Powerline Bushfire Safety Taskforce estimated the bushfire risk reduction of underground powerlines as 99% effective (Executive Summary page 5) compared to barewire overhead powerlines in a non-REFCL network. This estimate was accepted in the Regulatory Impact Statement (RIS page 23).

The CSIRO risk modelling documented in the RIS (pages 29 and 30) estimated the reduction in fire risk from REFCL installation at 48-60% compared to bare-wire overhead powerlines in a non-REFCL network. This estimate was based on the findings of the 2014 Frankston South REFCL Trial. Later tests at Kilmore South in 2015 on a REFCL more advanced than that at Frankston South indicated this estimate was conservative and the real figure was more likely to exceed 70%. However, the RIS estimate of 48-60% remains the only detailed risk modelling published to date.

The fire risk reduction benefits of REFCLs cannot exceed those of underground construction as REFCLs only address fire risk from earth faults, which is a sub-set of all fault types that can cause fires.

On this basis, exemption of the underground electric lines between the isolating transformer and the high voltage customer connection point would not be expected to adversely impact the mitigation of powerline bushfires. However, this conclusion must be qualified by broader considerations associated with ‘downstream’ assets not owned by the MEC.

5. Broader considerations – the customer network assets

The installation of an isolating transformer between the zone substation and the customer point of supply will prevent the delivery of required capacity generated by the zone substation REFCL at any point on the customer side of the isolating transformer. The only exception to this would be if the customer chose to install a REFCL on its own network.

It should be noted that the risk associated with polyphase electric lines ‘downstream’ of an isolation transformer is that of a local fire start only. The isolation transformer removes any risk of cross-country faults that could cause a fire elsewhere on the REFCL-protected zone substation network remote from the customer’s site.

The risk consideration set out in Section 3 above relies on the use of underground cable and metal-clad termination cubicles to preserve powerline bushfire safety. The applications and associated ESV assessments cover the evidentiary processes for meeting this requirement for the section of line owned by the MEC.

For the exemption to be confirmed as not degrading powerline bushfire safety on any section of the polyphase electric line as defined in the Act, two conditions must first be met:

1. All sections of the powerline on the customer side of the point of supply must be confirmed to be fire-safe to at least the level delivered by REFCL protection on a bare-wire overhead powerline; and

2. Effective controls must be in place to ensure this situation is preserved over time.

The exemption applications insofar as they seek relief from Section 120M of the Act do not fully address either of these requirements.

Each application contains a Section 8 entitled *Details of HV Customer Network*. These mostly conclude with a highly-qualified statement along the lines: “It is understood from information provided by the customer, that all polyphase electric lines in the facility are …”. The situation outlined in each application is summarised in the following table:

HV Customer	Description of customer's network in application
Pacific Hydro (Rub A)	All underground cable
Pacific Hydro (WN)	All underground cable
Australian Textile Mills	Mixed underground and overhead in LBRA
Uncle Toby's	All underground cable
Woolworths	All underground cable
Wonthaggi Wind Farm	All underground cable

The accompanying ESV Exemption Application Assessments provided for PBSC information note proposed conditions that would establish robust evidence and controls in respect of the assets owned by the MEC. Consideration should be given to mechanisms of similar strength to apply to assets owned by the HV customers.

6. Conclusion

On behalf of the Powerline Bushfire Safety Committee, I commend this advice for your consideration. Please do not hesitate to come back to me with any associated queries.

Yours

Signed
David I Harris
Chairman
Powerline Bushfire Safety Committee
26 June 2018

References

AusNet Services exemption applications dated 29th May 2018:

- AST Exemption Application – BWA Nestle Uncle Toby's
- AST Exemption Application – BWA Woolworths
- AST Exemption Application – RUBA Pacific Hydro
- AST Exemption Application – WGI Wonthaggi Wind Farm
- AST Exemption Application – WN Australian Textile Mills
- AST Exemption Application – WN Pacific Hydro