Proposed Changes to Chapter 8A and Chapter 14 of the Tasmanian Electricity Code

2022

Consultation Paper

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Submissions should be sent so that they are received by close of business on 7 October 2022.

To facilitate the publication of submissions on OTTER's website, submissions by email are preferred. Submissions and enquires may be made to:

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Copies of this Consultation Paper and the *Tasmanian Electricity Code* are also available on the Regulator's website: www.economicregulator.tas.gov.au.

Following consideration of submissions, if changes are made, they will be incorporated into the *Tasmanian Electricity Code* and published on OTTER's website.

1 BACKGROUND

The *Tasmanian Electricity Code* (the Code) sets out detailed arrangements for the regulation of the Tasmanian electricity supply industry and is established and enforceable under the *Electricity Supply Industry Act 1995* (the Act).

The purpose of Chapter 8A of the Code is to set out the requirements of relevant electricity entities relating to the management and the pruning and clearing of vegetation in the vicinity of distribution powerlines. Chapter 8A sets out:

- the minimum standards and practices for maintaining vegetation adjacent to distribution powerlines;
- who is responsible for maintaining the clearance space; and
- the role of the Distribution Network Service Provider (DNSP).

Chapter 8A specifies minimum vegetation clearance spaces that vary depending on the type of distribution powerline installed and the risk of fire ignition at that location. The clearance space is designed to provide fire safety in low fire risk areas (predominantly urban areas) and high fire risk areas (predominantly rural areas) and reliability and continuity of electricity supply. Clearance spaces are also dependant on:

- distribution powerline voltage;
- distribution powerline type;
- span length (the distance between poles);
- conductor size;
- distance along the distribution powerline conductors from the pole; and
- temperature of the distribution powerline conductors.

Distribution powerline types currently provided for in Chapter 8A are aerial bundled cables (ABCs), insulated service cables and cables other than these (typically bare wires).

Although the prescribed dimensions of clearance spaces are the same for low fire risk areas and for high fire risk areas, clearance spaces for ABCs may be less, depending on the type of vegetation, in low risk areas.

TasNetworks is the Distribution Network Service Provider (DNSP) for mainland Tasmania and Hydro Tasmania is the DNSP for the Bass Strait Islands.

2 PROPOSED CHANGES

TasNetworks has requested changes to Chapter 8A to:

- prescribe dimensions of clearance spaces for an additional type of distribution powerline, known as covered conductor thick; and
- change the definition of *insulated service cable* and replace the term with the term *insulated cable*.

Subject to the outcome of consultation, the Regulator proposes to adopt these changes.

Covered Conductor Thick

A covered conductor is a single core unscreened self-supporting cable with a plastic insulation covering.

To-date, covered conductors have primarily been used as overhead service cables connecting customers to the low voltage distribution network.

Under Australian Standard AS3675-2002, a covered conductor is defined as having a minimum average covering thickness of 2.0 mm for use on all working voltage up to and including 19/33 (36) kV.

Figure 1: the technical requirements for covered conductors from AS3675-2002

TABLE 2.1

TECHNICAL REQUIREMENTS FOR COVERED CONDUCTORS (CC)

1	2	3	4	5	6
Characteristic	**Units**	**Conductor size and type**			
Nominal cross-sectional area	mm^2	40	80	120	180
Stranding and nominal wire diameter	No./mm	7/2.75	7/3.75	7/4.75	19/3.50
Material		AAAC/1120 or AAAC/6201			
Approximate conductor diameter*	mm	8.3	11.3	14.3	17.5
Covering thickness:					
(a) minimum average	mm	2.0	2.0	2.0	2.0
(b) minimum at any point	mm	1.70	1.70	1.70	1.70
(c) maximum at any point	mm	2.50	2.50	2.50	2.50
Resultant overall diameter range*	mm	12.2 to 13.3	15.1 to 16.4	18.1 to 19.4	21.3 to 22.7
Approximate mass*	kg/km	210	340	500	710

* Given for information only.

If the insulation of a covered conductor is sufficiently thick to meet the requirements for the rated voltage, plus an additional margin to withstand limited vegetation rubbing, it is known as covered conductor thick (CCT). The minimum average covering thickness of CCT ranges from 3.4 mm to 8.0 mm depending on the rated voltage (see Figure 2).

Figure 2: the technical requirements for CCT from AS3675-2002

TABLE 2.2
TECHNICAL REQUIREMENTS FOR COVERED CONDUCTORS (CCT)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Characteristic	**Units**	**Conductor size and type**											
Nominal cross-sectional area	mm^2	40			80			120			180		
Stranding and nominal wire diameter	No./mm	7/2.75			7/3.75			7/4.75			19/3.50		
Material		AAAC/1120			AAC/1120 or AAAC/6201								
Approximate conductor diameter*	mm	8.3			11.3			14.3			17.5		
Voltage rating	kV	6.35/11	12.7/22	19/33	6.35/11	12.7/22	19/33	6.35/11	12.7/22	19/33	6.35/11	12.7/22	19/33
Covering thickness:													
(a) Minimum average	mm	3.4	5.5	8.0	3.4	5.5	8.0	3.4	5.5	8.0	3.4	5.5	8.0
(b) Minimum at any point	mm	2.96	4.85	7.10	2.96	4.85	7.10	2.96	4.85	7.10	2.96	4.85	7.10
(c) Maximum at any point	mm	4.00	6.40	9.30	4.00	6.40	9.30	4.00	6.40	9.30	4.00	6.40	9.30
Resultant overall diameter range*	mm	14.9 to 16.4	19.1 to 21.2	24.1 to 27.0	17.9 to 19.4	22.1 to 24.2	27.1 to 30.0	20.9 to 22.4	25.1 to 27.2	30.1 to 33.0	24.1 to 25.7	28.3 to 30.5	33.3 to 36.3
Approximate mass†	kg/km	255	370	540	450	635	900	640	845	1145	870	1105	1440

*Given for information only.

†Given for information only. Values are calculated for X-90 only.

CCT has similar insulation properties to ABCs, which means that it can withstand similar levels of vegetation contact. For ABC, the minimum average covering thickness ranges from 3.4 mm to 5.5 mm as required under Australian Standard AS3599, compared to 3.4 mm to 8.0 mm for CCT.

TasNetworks would like to use CCT more widely in its distribution network. However, previous manufacturing standards relied on heavy-duty materials as insulation which made such powerlines heavy. To use the previous generation of CCT widely would require DNSPs to upgrade poles and/or add extra poles as well as creating additional challenges for installers when handing and stringing powerlines in the field.

A new generation of CCT is now available that uses lightweight insulation. TasNetworks has advised that it is suitable for restringing to existing poles. TasNetworks expects CCT to be a cost effective alternative to ABCs when implementing strategies to reduce bushfire risk and the impact of vegetation clearance.

CCT can also be used for overhead high voltage (HV) lines. Its use can reduce bushfire risk by 98 per cent compared to bare cable according to an independent study by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 2017[1]. TasNetworks has advised that the bushfire risk reduction from CCT is similar to undergrounding the cables at only 25 per cent of the cost of undergrounding.

Chapter 8A does not prescribe dimensions of clearance spaces for CCT. Consequently, if a DNSP uses CCT, it would be required to implement the wider dimensions of clearance spaces prescribed for bare wires.

TasNetworks has proposed that Chapter 8A be amended to provide dimensions of clearance spaces for CCTs. As CCT has the same required minimum average covering thickness as ABC, TasNetworks has proposed that the clearances spaces for CCT be the same as for ABCs.

The proposed clearance spaces (those currently prescribed for ABCs), which vary between 0.5m and 1.0m depending on the span length (0.3m at the pole for all span lengths), are comparable to those adopted in other Australian states that have prescribed clearance spaces

[1] The study is not publicly available; however, third party reference to the study can be found here.

for CCT. Clearance spaces for spans greater than 100m in length have also been included because the lighter weight of CCT provides for the possibility of longer spans than are currently applicable to ABC.

Prescribed clearance spaces for CCT or equivalent cables in other states are summarised below:

- Victoria - from 0.3 metres to 0.9 metres depending on span length;
- New South Wales - 1.0 metre for all span lengths;
- Western Australia - 1.0 metre for all span lengths for insulated unscreened conductor (equivalent to CCT); and
- South Australia - 0.5 metres for all span lengths for insulated unscreened conductor (equivalent to CCT).

Change the definition of insulated service cable and replacement of that term with insulated cable

An *insulated service cable* is defined, in Chapter 14, as a *low voltage* multi-core cable insulated by a medium other than an air space as defined in *Australian Standard AS* 3000-1991 - SAA Wiring Rules, as amended or replaced from time to time, and used for the purpose of conveying electricity through a *service line*.

A *service line* is defined as the terminating span of an *electric line*:-

(a) constructed or designed or ordinarily used for the *supply* of electricity at *low voltage*; and

(b) through which electricity is, or is intended to be, *supplied* by a *Distribution Network Service Provider* to a *point of supply*.

Thus, an *insulated service cable* has both defined characteristics and is specifically the terminating (final) span from the distribution network to a *point of supply* (the customer's installation).

At present, a cable that has the physical properties of an *insulated service cable*, but is used for a purpose other than as the terminating span from the distribution network to a point of supply is treated in the same way as a bare wire for vegetation clearance space requirements.

TasNetworks has requested that the definition of *insulated service cable* be amended to remove the reference to a *service line*. In this way, an insulated cable with the required properties will be subject the same vegetation clearance spaces regardless of whether it is used as the terminating span from the distribution network to a *point of supply* or in some other situation.

An example where such a cable may be used in a manner that does meet the current definition is where there are two spans (with a crossover pole between them) from the distribution network to the *point of supply*. Insulated cables are used in the span before the crossover pole and in the terminating span. Under the current definition for *insulated service cable*, insulated cables used in the span from the distribution network to the crossover pole are subject to the vegetation clearance space for bare wires.

TasNetworks has also requested that the term *insulated service cable* be replaced with the term *insulated cable*.

3 PROPOSED ACTION

The Regulator proposes to amend the Code as outlined below. The relevant clauses are included in marked-up format.

3.1 Clause 8A.2.1 General

Clause 8A.2.1 describes the methods of maintaining the clearance space, which include using insulated cable to reduce the clearance space required.

The proposed change is to insert *covered conductor thick* wherever *aerial bundled cable* is referred to as a type of insulated cable.

8A.2.1 General

There are a number of methods of maintaining the clearance space. The most common method is pruning and clearing of vegetation. Other methods include:

- using construction methods such as underground *electric lines*;
- selecting *distribution powerline* routes which avoid vegetation;
- using engineering solutions, for example, taller poles for low growth vegetation areas;
- planting appropriate vegetation species which will not interfere with distribution powerlines even when fully grown;
- informing private landowners as to appropriate vegetation species to be planted under and around *distribution powerlines*; and
- using insulated cables such as *aerial bundled cable* and *covered conductor thick*, for which the clearance space is less than for bare conductors ~~to reduce the clearance space required~~(refer clause 8A.3.3).

3.2 Clause 8A.3.3 Factors Affecting Dimensions of Distribution Powerline Clearance

Clause 8A.3.3 describes how various factors affect the distribution powerline clearance dimension. The factors include the type of distribution powerline.

The proposed change is to insert reference to *covered conductor thick* when aerial bundle cable is referred to as a type of insulated cable.

8A.3.3 Factors Affecting Dimensions of Distribution Powerline Clearance

The dimensions of the *clearance space* are also dependent on factors associated with the type of *distribution powerline* installed and include:

a) *Distribution powerline* voltage -

the voltage level of the *distribution powerline* influences the potential for electric discharge. The higher the voltage the greater the potential and hence the need for a greater *clearance space*.

b) *Distribution powerline* type -

insulating *distribution powerline* conductors reduces the risk of electric discharge. Using an *aerial bundled cable*, *covered conductor thick* or other insulated conductors reduces the necessary dimensions of the *clearance space*, compared to bare conductors.

c) Span length (distance between poles) -

as the span length increases, the added weight of the *distribution powerline* conductors causes an increase in distribution powerline sag. *Distribution powerline* conductors can sway with the wind. Therefore, all dimensions of the clearance space ~~must~~ are required to be greater as the span length increases.

…

3.3 Clause 8A.3.4 Clearance Space Dimensions

Clause 8A.3.4 prescribes the dimensions of clearance space for different types of distribution powerlines.

The proposed changes are to align the dimensions of clearance space for CCT with *aerial bundle cable,* insert a reference to *covered conductor thick,* replace the term *insulated service cable* with the term *insulated cable*, and insert an additional column 5 in Table 1 to prescribe clearance spaces for spans of greater than 100m.

8A.3.4 Clearance Space Dimensions

(a) The dimensions of the *clearance space* in *low fire risk areas* and *high fire risk areas* for high voltage and low voltage distribution powerlines constructed with *aerial bundled cable*, *covered conductor thick* and *insulated ~~service~~ cable* are those prescribed in Table 1. For *low fire risk areas* only, the clearance space for *aerial bundled cable* and *covered conductor thick* at the pole as specified in column 1 of Table 1 may be reduced where tree trunks and limbs near the cable present no risk of abrasion. For *low fire risk areas* only, the clearance space between *aerial bundled cable* or *covered conductor thick* and foliage may also be reduced to allow foliage, which has insufficient strength to abrade the cable for the duration of the pruning and clearing cycle, to remain in contact with the *aerial bundled cable* or *covered conductor thick.*

(b) The vertical dimensions of the *clearance space* for *low fire risk areas* and *high fire risk areas* for *distribution powerlines* other than those constructed with *aerial bundled cable, covered conductor thick* and *insulated ~~service~~ cable* and for the operating voltages given are those prescribed in Table 2.

(c) The horizontal dimensions of the *clearance space* for *low fire risk areas* and *high fire risk areas* for *distribution powerlines* other than those constructed with *aerial bundled cable, covered conductor thick* and *insulated ~~service~~ cable* and for the operating voltages given are those prescribed in Table 3.

Notes Relating to the Tables

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4. For *aerial bundled cable, covered conductor thick* and *insulated ~~service~~ cable,* the *clearance space* can generally be in the form of a circle in *low fire risk areas* and *high fire risk areas*.

...

7. The figures in columns 2 to ~~4~~ 5 in Table 1, columns 2 to 8 in Table 2 and columns 2 to 26 in Table 3 are clearance dimensions for powerline spans of the lengths indicated.

Table 1: Low and High Fire Risk Areas

Dimensions of *Clearance Space* from a still Distribution Cable - *Aerial bundled cable and covered conductor thick* and *insulated ~~Service~~ cable (high voltage and low voltage)*

Note: Table 1 is illustrated in Figure 2.

Type of Powerline	Clearance Spaces/Point of Maximum Sag				
	At Pole	Away from Pole			
	Column 1 All Spans	Column 2 Span <40m	Column 3 Span 40-70m	Column 4 Span 70-100m	Column 5 Span >100m
	In all directions				
Aerial bundled cable and covered conductor thick	0.3m	0.5m	0.5m	0.7m	1.0m
Insulated ~~service~~ cable	0.5m	0.6m	1.0m	-	-

Figure 2: Low and High Fire Risk Areas

Aerial bundled cable, *covered conductor thick* and *insulated ~~service~~ cable*

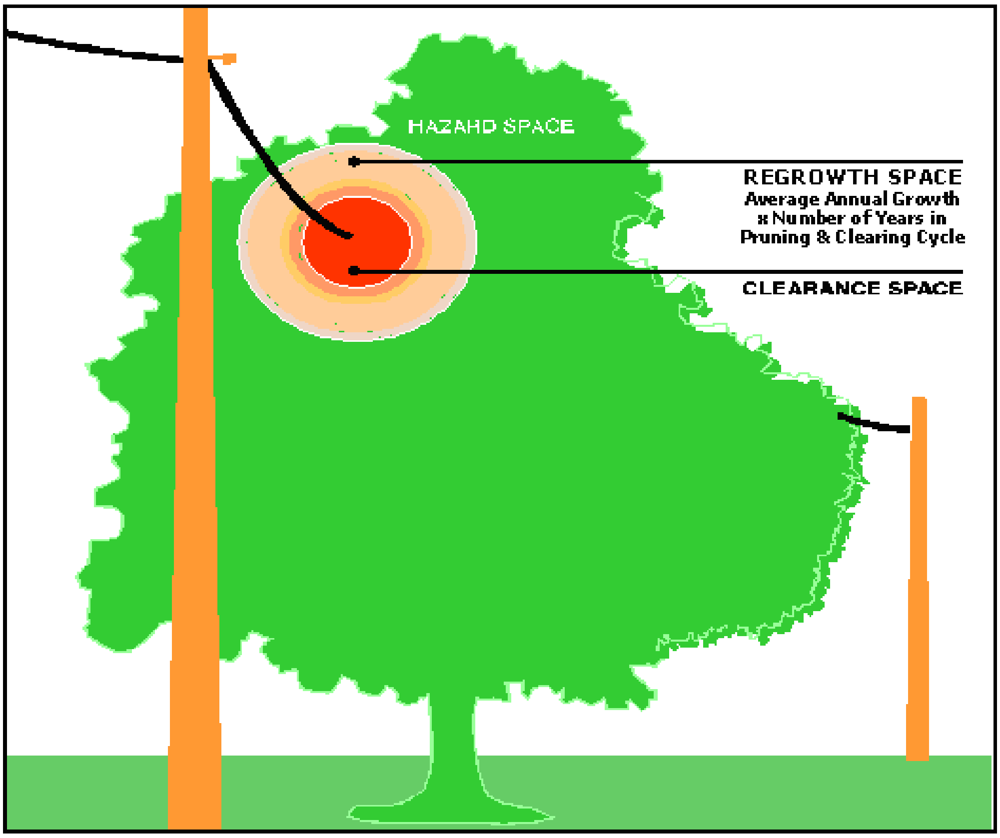

Table 2: Low and High Fire Risk Areas

Vertical dimensions of the *Clearance Space* below a still Distribution Powerline Conductor – Other than *aerial bundled cable*, *covered conductor thick* and *insulated ~~service~~ cable*.

Type of Powerline and Conductor	Clearance Spaces / Mid Span							
	At Pole	Span Length						
	Column 1 All spans	Column 2 Span <40m	Column 3 Span <60m	Column 4 Span <80m	Column 5 Span <100m	Column 6 Span <125m	Column 7 Span <150m	Column 8 Span >150m
Bare LV[2]: All	1.0m	1.0m	1.5m	1.5m	1.5m	1.5m	1.5m	2.0m
Bare HV:								
Small[3]	1.5m	1.5m	1.5m	2.0m	2.0m	2.0m	2.0m	2.5m
Medium	1.5m	1.5m	1.5m	2.0m	2.0m	2.5m	2.5m	2.5m
Large	1.5m	1.5m	1.5m	2.0m	2.5m	2.5m	2.5m	2.5m

[2] LV means low voltage, HV means high voltage.
[3] See definition of *conductor size* in Chapter 14 for explanation of '*Small*', '*Medium*' and '*Large*'.

Table 3: Low and High Fire Risk Areas

Horizontal dimensions of the *Clearance Space* from a still Distribution Powerline Conductor – Other than *aerial bundled cable*, *covered conductor thick* and *insulated ~~service~~ cable*

Type of Powerline and Conductor	Clearance Spaces / Mid Span								
	At Pole	Span Length							
	Column 1 All spans	Column 2 Span <40m	Column 3 Span <60m	Column 4 Span <80m	Column 5 Span <100m	Column 6 Span <125m	Column 7 Span <150m	Column 8 Span <175m	Column 9 Span <200m
Bare LV[4]: All	1.0m	1.0m	1.5m	1.5m	2.5m	3.0m	3.5m		
Bare HV: Small[5] Medium Large	 1.5m 1.5m 1.5m	 1.5m 1.5m 1.5m	 1.5m 1.5m 1.5m	 2.0m 2.0m 2.0m	 2.0m 2.0m 2.5m	 2.0m 2.5m 3.0m	 2.0m 3.0m 3.5m	 2.0m 4.0m 4.5m	 2.5m 4.5m 5.5m

Type of Powerline and Conductor	Clearance Spaces / Mid Span								
	Span Length								
	Column 10 Span <225m	Column 11 Span <250m	Column 12 Span <275m	Column 13 Span <300m	Column 14 Span <325m	Column 15 Span <350m	Column 16 Span <375m	Column 17 Span <400m	Column 18 Span <425m
Bare HV: Small Medium Large	 3.0m 5.5m 6.5m	 3.5m 6.5m 8.0m	 4.0m 7.5m 9.0m	 4.5m 9.0m 10.5m	 4.5m 10.5m 12.5m	 5.0m 11.5m 14.0m	 5.5m 13.5m 16.0m	 6.5m 15.0m 18.0m	 7.0m 16.5m 20.0m

Type of Powerline and Conductor	Clearance Spaces / Mid Span								
	Span Length								
	Column 19 Span <450m	Column 20 Span <475m	Column 21 Span <500m	Column 22 Span <525m	Column 23 Span <550m	Column 24 Span <575m	Column 25 Span <600m	Column 26 Span >600m	
Bare HV: Small Medium Large	 7.5m 18.5m 22.0m	 8.5m 20.5m 24.5m	 9.0m 22.5m 27.0m	 10.0m 25.0m 29.5m	 11.0m 27.0m 32.0m	 11.5m 29.5m 35.0m	 12.5m 32.0m 38.0m	 15.0m 35.0m 45.0m	

[4] LV means low voltage, HV means high voltage.
[5] See definition of *conductor size* in Chapter 14 for explanation of '*Small*', '*Medium*' and '*Large*'.

3.4 Chapter 14 Glossary

Chapter 14 of the Code is the glossary for terms used in the Code.

The proposed changes are to insert a definition for covered conductor thick and change the definition of insulated service cable by removing the term service and reference to service line.

Chapter 14 Glossary

covered conductor thick	An insulated conductor manufactured in accordance with the specification set out in A1.3 AS/NZS 3675 and referred to in that Standard as CCT, as published or amended from time to time.
insulated ~~service~~ cable	A low voltage multi-core cable insulated by a medium other than an air space as defined in *Australian Standard* AS 3000-1991 - SAA Wiring Rules, as amended or replaced from time to time.~~, and used for the purpose of conveying electricity through a service line~~.