Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Building and Energy

Guidelines for the safety of buildings near network operator electrical assets

> May 2020

Preface

These Guidelines for the safety of buildings near network operator assets are issued under Section 33AA of the *Electricity Act 1945*.

The risks and potential consequences of an electrical incident involving building encroachments too near network operator assets are significant, especially for high voltage. The danger justifies stringent safety design criteria for buildings to prevent injury to persons and major damage to electrical installations and buildings.

I strongly recommend compliance with the information set out in these guidelines.

Saj Abdoolakhan
Director of Energy Safety

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Summary

- These guidelines have been produced to assist property owners, surveyors, planners, architects, builders and local governments to give due consideration to safe clearances from network operator overhead and underground electricity infrastructure when designing and planning buildings, signs and other structures.
- These guidelines complement, and should be read with, other related documents including (but not limited to):
    - The Electricity (Network Safety) Regulations 2015
    - Western Australian Electrical Requirements (WAER)
    - Relevant technical standards
    - *Occupational Safety and Health Act 1984* (OSH Act)
    - Occupational Safety and Health Regulations 1996 (OSH Regulations)
- Technical requirements for design and construction purposes are covered by legislation and technical standards and are not repeated in these guidelines.

1. Introduction

1.1 Duty of care

The designers, constructors and owners of buildings share responsibility for the safety of people and property in relation to buildings sited near network operator electrical assets.

1.2 Electrical risks

The most common risks of death or injury caused directly or indirectly by electricity are:

- electric shock;
- arcing, explosion or fire; and
- toxic materials released by burning and arcing associated with electrical equipment.

Electric shocks from electrical equipment may also lead to related injuries, including falls from ladders, scaffolds or other elevated work platforms. Other shock related injuries or illnesses may include muscle spasms, palpitations, nausea, vomiting, collapse and unconsciousness.

Under occupational safety and health legislation, the responsible person has the primary duty to ensure, so far as is reasonably practicable, that workers and other persons at the workplace are not exposed to electrical risks. This duty requires eliminating or minimising and managing these risks.

1.3 Definitions

For the purposes of these guidelines:

Responsible person is the person responsible for the safety of people and property in relation to the surveying, planning, designing, building management and conduct of undertakings at those properties. The OSH Act and the OSH Regulations establish duties upon a number of persons in respect to workplaces.

Network operator means a person who is a network operator under the Electricity (Network Safety) Regulations 2015.

2. Overhead power lines

2.1 General

Overhead power lines are predominately located in the road reserve. However, there are locations where power lines have been lawfully placed on private land, and they remain the property of the network operator. The network operator owner is deemed to have right of access to these assets.

Certain power lines may exist within a land easement taken out over a property by a network operator. Where an easement exists, it is incumbent on the responsible person to consult with and gain approval from the network operator for any activity within the easement.

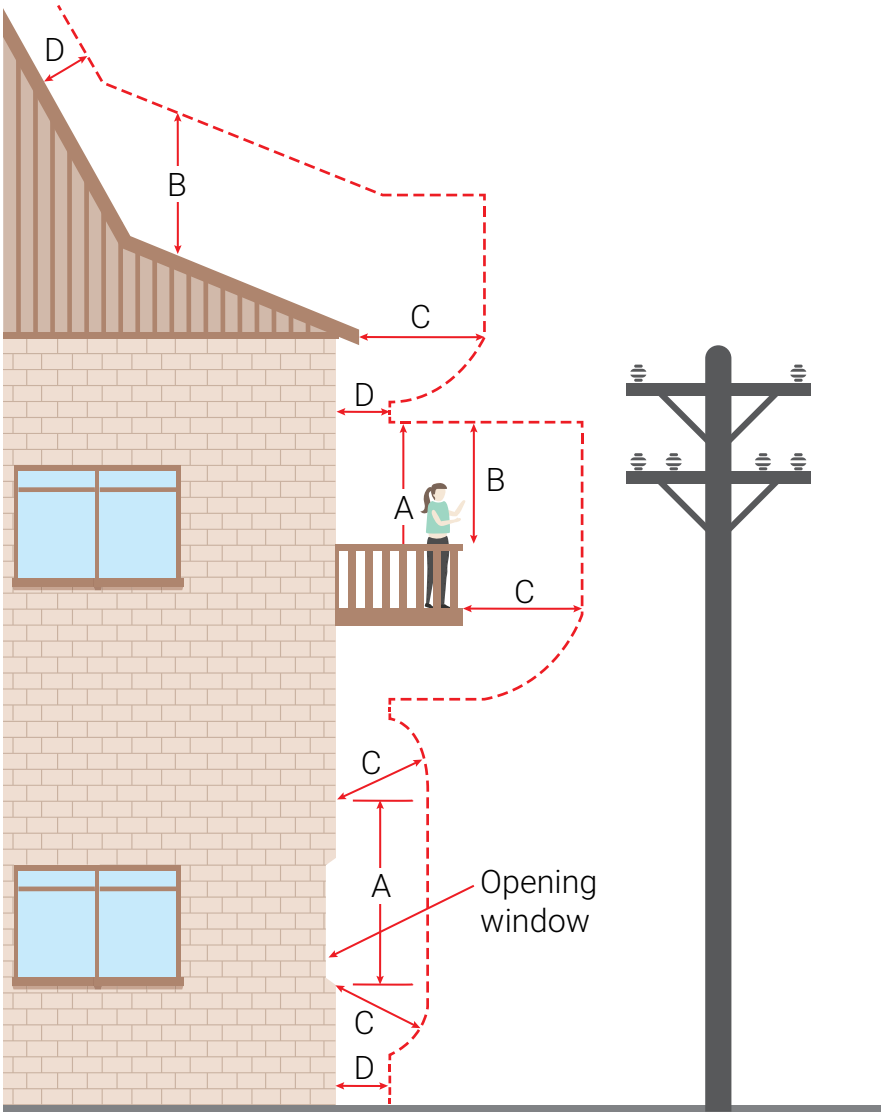
2.2 Technical requirements

Clearances to overhead power lines are governed by their operating voltage. The table in section 2.3 of these guidelines provides the minimum separation for the voltages commonly used. The clearance measurement is from the overhead cable, wire or conductor.

Clearance must be maintained at all times. Therefore, sag and sway of power line conductors, particularly mid-way between power poles, needs to be considered in addition to the distances listed. Sag and sway are influenced by varying weather conditions of wind and temperature, electrical power loading on power lines and the span length between power poles. Sag and sway may require a case by case consideration as determined by the network operator.

2.3 Structure clearances

The minimum clearance from the overhead power line wires to any building or structure is shown in the following diagram. It is common for power lines to have multiple voltage circuits on a single pole.



Clearances from structures[1]

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Clearances for the different voltages (U volts)[2]

Clearance	U ≤ 1000V			U> 1000V	
	Insulated	Bare neutral	Bare active	Insulated with earthed screen	Insulated without earthed screen
	m	m	m	m	m
A Vertically above those parts of any structure normally accessible to persons	2.7	2.7	3.7	2.7	3.7
B Vertically above those parts of any structure not normally accessible to persons but on which a person can stand	2.0	2.7	2.7	2.7	2.7
C In any direction (other than vertically above) from those parts of any structure normally accessible to persons, or from any part not normally accessible to persons but on which a person can stand	1.0	0.9	1.5	1.5	1.5
D In any direction from those parts of any structure not normally accessible to persons	0.1	0.3	0.6	0.1	0.6

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Clearance	1000V <U≤ 33kV	33kV <U≤ 132kV	132kV <U≤ 275kV	275kV <U≤ 330kV	330kV <U≤ 500kV
	Bare or covered	Bare	Bare	Bare	Bare
	m	m	m	m	m
A Vertically above those parts of any structure normally accessible to persons	4.5	5.0	6.5	7.0	8.0
B Vertically above those parts of any structure not normally accessible to persons but on which a person can stand	3.7	4.5	6.0	6.5	7.5
C In any direction (other than vertically above) from those parts of any structure normally accessible to persons, or from any part not normally accessible to persons but on which a person can stand	2.1	3.0	4.5	5.0	6.0
D In any direction from those parts of any structure not normally accessible to persons	1.5	2.5	3.5	4.0	5.0

The responsible person must consult the network operator.

2.4 Consideration for construction and maintenance

Designers should consider the implications for safety during construction and future maintenance of buildings and structures in the vicinity of overhead power lines. Provision should be made for the safety of personnel required to access facades during construction and maintenance as required by the OSH Act and the OSH Regulations and be included by the designer as part of the construction and future maintenance documentation.

3. Underground Power Cables

3.1 General

Underground power cables are predominately located in road reserves. However, there are locations where power lines have been lawfully placed on private land, and they remain the property of the network operator The network operator owner is deemed to have right of access to these assets.

Connection equipment to the underground cables is predominately located on private land and by legislation this equipment is to be taken to have been lawfully placed and will continue to be the property of the network operator. The network operator is deemed to have right of access to their assets.

3.2 Equipment types

It is not uncommon for network operators to have multiple cables buried in a single location. Many of these cables can be at different voltages and will require specific safety clearance requirements.

Much of the connection equipment for underground cables sit above the ground. This equipment comprises:

- switchgear housed inside kiosks, compounds and buildings;
- transformers housed inside kiosks, compounds and buildings;
- pillars providing electrical supplies to separate properties; and
- pits providing electrical supplies.

3.3 Technical requirements

Network operators need unimpeded safe access to their assets. Design of buildings, structures and vehicular access must consider the location of network operator assets to ensure equipment access is maintained and is not vulnerable to damage by vehicles.

Excavation at building sites must ensure adequate shoring to protect network operator assets and the safety of site personnel working near electrical equipment.

3.4 Dial Before You Dig

Responsible persons should always confirm the location of underground assets prior to any activity.

Confirmation should occur at the planning and design phases of a building project.

Confirmation of underground assets should be undertaken again before construction begins.

4. Network operators

4.1 Network operator contacts

During planning, design and construction all queries should be made to the relevant network operator.

Horizon Power Horizon Power, Head Office Stovehill Road Karratha WA 6714 karratha@horizonpower.com.au	**Rio Tinto Iron Ore** Rio Tinto Iron Ore – Utilities GPO Box A42 Perth WA 6837
Western Power Western Power GPO Box L921 Perth WA 6842	**BHP Billiton Iron Ore** BHP Billiton Iron Ore Supply Authority PO Box 65 Newman WA 6753 supplyauthority@bhpbilliton.com

Government of Western Australia

Department of Mines, Industry Regulation and Safety

Building and Energy

1300 489 099

8.30am – 4.30pm

Level 1 Mason Bird Building
303 Sevenoaks Street
(entrance Grose Avenue)
Cannington Western Australia 6107

Online
Website: www.dmirs.wa.gov.au/building-and-energy
Email: be.info@dmirs.wa.gov.au

Mailing address
Locked Bag 100
East Perth WA 6892

Regional offices

Goldfields/Esperance	(08) 9021 9494
Great Southern	(08) 9842 8366
Kimberley	(08) 9191 8400
Mid-West	(08) 9920 9800
North-West	(08) 9185 0900
South-West	(08) 9722 2888

National Relay Service: 13 36 77
Translating and Interpreting Service (TIS) 13 14 50
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